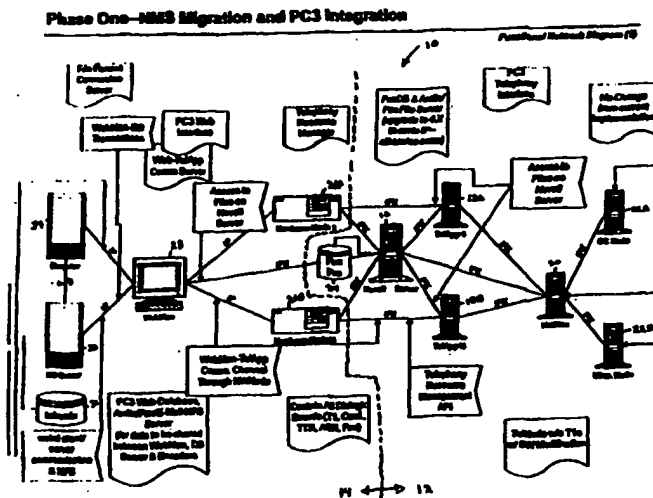




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : H04L</p>	<p>A2</p>	<p>(11) International Publication Number: WO 98/23058</p>	<p>(43) International Publication Date: 28 May 1998 (28.05.98)</p>
<p>(21) International Application Number: PCT/US97/20986</p> <p>(22) International Filing Date: 17 November 1997 (17.11.97)</p> <p>(30) Priority Data: 60/031,301 18 November 1996 (18.11.96) US</p> <p>(71) Applicant (for all designated States except US): PREMIERE COMMUNICATIONS, INC. [US/US]; The Lenox Building, Suite 400, 3399 Peachtree Road, Atlanta, GA 30326 (US).</p> <p>(72) Inventors; and</p> <p>(75) Inventors/Applicants (for US only): FREISHTAT, Gregg, S. [US/US]; 2078 Renfroe Lake Drive, Dunwoody, GA 30338 (US). LEITESS, James, K. [US/US]; 929 Highland Terrace N.E., Atlanta, GA 30306 (US). COWDEN, Michael, J. [US/US]; Unit B-317, 1074 Peachtree Walk, Atlanta, GA 30309 (US). SMITH, David, Gregory [US/US]; 1907 Oakmont, Tampa, FL 33629 (US).</p> <p>(74) Agents: PRATT, John, S. et al.; Kilpatrick Stockton LLP, Suite 2800, 1100 Peachtree Street, Atlanta, GA 30309-4530 (US).</p>		<p>(81) Designated States: AL, AU, BA, BB, BG, BR, CA, CN, CU, CZ, EE, GE, GH, HU, ID, IL, IS, JP, KP, KR, LC, LK, LR, LT, LV, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, SL, TR, TT, UA, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published</p> <p><i>Without international search report and to be republished upon receipt of that report.</i></p>	

(54) Title: SYSTEM FOR INTEGRATED MANAGEMENT OF MESSAGING AND COMMUNICATIONS



(57) Abstract

Systems for providing to a user an integrated interface for accessing telephony- and computer network-based communications resources. A user may access the systems via telephone or computer (via modem or Internet). The user may access messages addressed to him or her in various media, such as e-mail, voice mail, fax, etc. The user may respond to these messages in the same media, or different media, including real-time communications such as direct telephony or conference calling. The interface may also allow the user to present others with a web page which displays information selected by the user. The system may consist of a stand alone system which interfaces with the Internet and the telephony network. The system may also be integrated with existing telephony-based communication management infrastructures.

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SYSTEM FOR INTEGRATED MANAGEMENT OF MESSAGING AND COMMUNICATIONS

This application claims priority to U.S. Provisional Application Serial No.

5 60/031,301, filed November 18, 1996.

Background of the Invention

The present invention relates generally to communication technologies such as electronic mail (e-mail), voice mail, paging, conference calling and facsimile (fax) mail messaging. Particularly, the present invention relates to systems for integrating
10 conventional telephony-based communication management services and capabilities with Internet-based communication management applications and capabilities.

Current communication technology utilizes several media, such as e-mail, voice, voice messaging, paging, video, video messaging, conference calling and facsimile. Such messages and media may be accessed through a wide variety of interfaces such as pagers,
15 wireline telephones, cellular and PCS telephones and computers (through direct dial modem, network or Internet access). With such a wide array of options in both medium and interface, systems have been provided for centralizing a user's communications in order to simplify access to these communications while at home, in the office or traveling. For example, U.S. Patent Application No. 08/665,564, filed June 18, 1996
20 entitled "System For Integrated Electronic Communications" (James Arthur Kitchen, David Gregory Smith, Leonard A. DeNittis, Kyle S. Brown, Michael S. Finney, Thomas Francis Johnson, III, Steve Feinstein, and Stephen J. H. Owens, inventors) which is incorporated herein in its entirety by this reference, describes a "universal mailbox" which comprises a fax server, an e-mail server and a voice mail server. Each server

receives and stores messages for a given user. The messages can thereafter be retrieved by the user at his or her convenience, using only a telephone interface. The servers are networked together and may be accessed from a single telephone interface; cross media capability allows e-mail messages, for instance, to be converted to voice. Moreover, the user is able to route messages to desired destinations; for instance, the user can access the system, designate a nearby telephone number, and have his or her communications sent to devices at that number. Thus, communications directed to a user are brought together in one place. Nonetheless, the means for accessing the communications are restricted to telephones and, in some cases, direct dial modem hookups.

Universal mailboxes are limited in that they typically do not support real-time communications. For instance, upon receiving a message from a universal mailbox, a user may wish to contact one or more persons, either sequentially or simultaneously. In the current environment, the user must sever his or her connection with the universal mailbox and then individually dial each person he or she wishes to contact. This can be time consuming and inefficient. Performing a conference call can be, paradoxically, even more difficult, requiring the assistance of an operator for dealing with complex command sets through a PBX. Thus, it would be desirable to provide a user-friendly interface which allows a user to access the features of a universal mailbox and engage in real-time communications without having to leave the mailbox environment.

Accessing universal mailboxes, even through computers, also provides limited flexibility because specialized software is required. Thus, users must learn how to operate the software, which may be time consuming. Also, as new versions of the

software are released, compatibility problems between the users' platforms and the universal mailbox arise. These problems may be related to inconsistent software compatibility across the multitude of platforms employed by users or compatibility problems between the user and the mailbox as different users use different versions of the access software. Thus, it would be desirable to provide a network-based interface that relies on global standards, such as World Wide Web (WWW) protocols, so that each user need not have specialized hardware or software in order to access and use the system. Thus, a user could employ any browser or Internet protocol to establish communications with and use the system to manage his or her communications and messaging.

Communications delivered to a user may be multiple messages delivered over various media from one sender or many. Thus, a user may need to respond to various senders' e-mails, voice messages and faxes. Keeping track of the e-mail address, fax number and voice number of even a single person can be very difficult, particularly when one is away from the office. This problem is compounded when a user must maintain communications over multiple media with multiple persons. Thus, it would be desirable to provide an interface which allows a user to direct messages and communications to any number of individuals across any number of media while relying on information stored in the system to direct the messages and communications appropriately.

Furthermore, while a message may be received in one medium, such as e-mail, it may be desirable to receive it and/or direct a response in a different medium, such as voice mail. This may be because the individual to whom the message is addressed may prefer one medium over another; it may simply be because at that point in time, the user

has no computer handy. Also, if the same message is to be delivered to several individuals, the user may wish to deliver the message via e-mail to some, fax to others and voice mail to the remainder. Thus, it would be desirable to provide functionality for directing a single message to one or more individuals in multiple formats.

- 5 Mass communications, such as fax broadcasting and conference calling, while particularly useful, are often complicated and cumbersome to implement. Thus it would be desirable to provide a communications management interface that allows mass communications to be easily and efficiently implemented.

- While the Internet has emerged as a source of information and communications
10 for many, the current universal mailboxes do not provide accessibility to the Internet. It would be desirable to provide a system which allows users to access their communications via the Internet, and, when possible, take advantage of the lower communications costs associated with the Internet to communicate with others. For instance, in sending out multiple responses to a message, a user may wish to attach a
15 voice file to an e-mail message for delivery over the Internet, rather than pay the cost of multiple traditional telephone hookups. Furthermore, it would be desirable to allow others to contact the user via the Internet. This would allow the user to present to others considerably more information than would be traditionally available, for instance, on a voice mail system.

- 20 Existing systems provide the user only with information specifically addressed to the user. Thus, in order to access generally available information, such as news, sports, weather, financial, or other information, a user must subscribe to services which will

identify and forward that information to the user's address. Much of this information is available, however, from publicly accessible areas, such as Internet World Wide Web (WWW or Web) pages. Thus, it would be desirable to allow the user to customize the interface such that he or she may easily access such sources of information, either using a
5 computer or a telephone interface.

Although a computer is often the simplest and most powerful means of accessing information, situations may arise in which access to a computer may be limited or non-existent. Thus, it would be desirable to provide an interface which, while accessible via computer, is still accessible from other interface units such as telephones.

10 Current telephony-based universal mailbox systems are relatively mature technologies and therefore have many desirable features that are established and fully operational. Thus, while it may be desirable to provide standalone systems for integrated computer/telephony communications, it may also be desirable to provide computer communication systems which can be added to existing computerized telephony
15 communications systems in order to take advantage of the mature technology embedded in the exiting telephony systems.

Summary of the Invention

The present invention provides network-based communication and information systems that leverage existing computer telephony information processing, storage and
20 retrieval platforms with the power and economies of the Internet and private data networks. The systems make communication and access to information more efficient and save users time and money. In a first embodiment, certain communications hardware

and features of a computer telephony-based system are off-loaded to a separate hardware node. For instance, fax boards, voice mail boards and text to speech boards are removed from the telephony management node and placed in one or more stand alone computers, such as "hardware nodes." An Internet node is then added to the system. Computer

5 telephony communication management nodes, which can be conventional telnodes that are thin on hardware (the hardware having been placed in the hardware nodes) but on which the applications reside (the "telapps"), and the Internet node then access the hardware nodes as various functionalities are required, using Internet protocols. The applications on the telnodes are therefore accessible to fax boards, T1 boards, and other

10 components of the hardware nodes in a manner that is far more flexible than in conventional computer telephony systems which rely on conventional networking techniques and protocols. For instance, if a user, accessing the system via the Internet wishes to send a fax, a command is sent through the Internet node to the appropriate hardware node, which handles the actual fax process; the hardware node runs the

15 application from the telapp, and the telapp interfaces with the network server for billing and administration purposes. Such billing systems have the capacity, preferably, to interface with remote credit or payment sources, such as those of banks or credit card companies, in real time, in order to transfer funds as required or otherwise maintain proper account status.

20 Likewise, a user accessing the system through telephony generates a command to the telapp, which commands the hardware node to process and deliver the fax; billing and administration can be handled in conventional ways or as otherwise desired. Both the

telapps and the Internet node have access to data in the billing information systems concerning customer accounts, preferences, contact information, etc. in order to process and bill the transaction. Common or distributed databases may be provided to serve this need. If distributed databases are employed, i.e., one database for the Internet node and
5 one for the telapp, it may be desirable to have the information mirrored from one database to the other to ensure synchronization of customer data. Either the telephony network manager or the Internet network manager may be responsible for synchronizing the distributed databases.

An integrated computer/telephony communications system may also be provided
10 which does not utilize existing telephony-based communications management systems infrastructure. In such a system, a single database may be used. One or more hardware nodes can be provided which use Internet protocols to communicate with applications functionality for flexibility, and a single network management system can be utilized. The network management system draws on a plurality of applications which in turn
15 access hardware elements on the hardware node to provide system functionality. In other words, a user can access the network manager via either telephony or the Internet. User commands to the network manager access applications stored therein or on a separate applications node. The applications then access hardware (such as fax boards, TTS boards, voicemail boards, etc.) on the hardware node and the user's commands are
20 implemented.

Regardless of which embodiment is used, the combination of computer and telephony communications provides a user with powerful tools and features for managing

his or her communications needs. Because the computer and telephony networks are integrated, a user no longer need sever his or her connection with the computer network to conduct real-time communications via the telephony network - live phone calls and even conference calls can be placed via the computer interface. Likewise, with the advent of text to speech conversion capabilities, e-mail- and word processing document-to-fax conversion capabilities and other media conversion capabilities, access to communications from a telephone are not limited to voice mail messages. A user can direct e-mails, faxes and other communications to a fax machine of his or her choice. A user can even "listen" to his or her text based communications.

10 Traditionally, users of computer telephony based servers could instantly retrieve all voice, fax, e-mail, or other information from any telephone. The present invention allows users to retrieve all messages and other information from their desktop PC and also respond or forward messages to other people with a click of their mouse or a simple keystroke from any telephone. Conference calling is so simple that two clicks of the mouse creates a normal telephone conference call in seconds and for a fraction of the cost of using an operator.

 Because the system is network-based, users may access advanced computer telephony functionality without purchasing or installing any new hardware or software. The system can be completely platform independent and can be effectively used by customers with literally no computer or Internet skills. This approach gives users the ability to communicate with anyone and access information anytime, anywhere. Whether on the Internet or by any telephone, the system allows users to access their personal on-

line phone directory, custom information such as stock reports and news, fully automated conference call and fax capabilities, and the power of "people centered communication".

People centered communication is a data base structure and program which simplifies the process of communicating and accessing information. The system

5 eliminates the need to remember and organize the myriad of fax machine numbers, pagers, cell phones, multiple office and home numbers, and voice mail box addresses that now clutter business communications. Its on-line personal directory allows the user to send voice, fax or page messages to anyone without looking up or dialing any numbers. The on-line directory organizes personal and business contacts into logical groups to

10 which the user can instantly broadcast voice, fax, or pager notifications.

Communications preferences and technical skills vary widely. While some prefer pagers to cell phones, others use e-mail instead of faxes. Every company seems to have a unique system for receiving and responding to business communications. For this reason, systems according to the present invention employ a "cross media messaging" strategy.

15 Cross media messaging means that each person receives communications according to their own preferences - independent of how the message was originally sent or the technology employed. If a message were forwarded to a group of nine people; four might receive a fax at their office, three might receive it as an attachment to an e-mail message (cost savings and convenience), and two would be paged. Likewise, voice messages and

20 other communications or information can be instantly sent to individuals or groups of people using the system's innovative cross media messaging component.

The distributed computer telephony systems according to the present invention utilize Internet or conventional network-based platforms that allow users direct access to existing telecommunication infrastructures without any investment in premise-based hardware or any specialized software. By leveraging the open standards of the Internet, 5 the systems allow users to access and/or configure their personal assistant from any standard Web browser without purchasing or installing any software on their computer, private network, or existing phone system. Thus, systems according to the present invention can be completely platform independent.

Since all data and equipment are resident in a single facility, users can access their 10 information and communication resources from anywhere in the world – from either a PC connected to the Internet or any touch tone telephone. When at the office or connected to the Internet, users can take advantage of the economies of packet-switched communications such as no cost e-mail transport, low cost retrieval of voice and other data, and direct access to their personal on-line directory. Significantly, if a user logs off 15 the Internet or does not even own a computer, he or she is still in touch with all of the system's communication and information resources from any touch tone phone – worldwide.

For example, a business person on the road or in an airplane can send multiple messages with a single phone call, set up conference calls from a cell phone, or send a 30- 20 person fax broadcast from any telephone or PC within seconds. All of this is made possible through computer telephony platforms according to the present invention which allow the customer to initiate complex telecommunication transactions with great ease.

Systems according to the present invention can include a universal in-box which provides a single mailbox where users can retrieve, listen to, view, download, forward and/or save all of their inbound communications including voice mail, faxes, pages, and e-mail. All messages can be viewed or downloaded from any PC with an Internet
5 connection and can be forwarded to others by e-mail, fax, or voice regardless of whether or not they have Internet access or are customers of the system provider. Since the system is wholly Internet, intranet or network-based, all features of the universal in-box can be accessed from any touch tone telephone.

Systems according to the present invention can also provide simplified conference
10 calling. Whether at a PC or at any touch tone telephone, the user finds setting up conference calls a procedure that is simplified to a few mouse clicks or telephone keystrokes. The user eliminates the need for a conference call operator and takes control of the call. This feature replaces complex, confusing PBX systems. Seconds after requesting a conference call with a group of people, the user's phone rings and the
15 system's automated attendant does the rest. Each party is called by the system which retrieves all required numbers and automatically places all phone calls. Since the customer is actually in control of the system's resources, muting and dropping of callers can be accomplished with a single click of the mouse.

Each system user may have a personal on-line directory which is fully accessible
20 from any touch tone telephone or any PC with an Internet connection. The on-line directory can store and organize contact names, addresses, phone numbers, pager information, notes, and other data. To place a call, send a fax, or page anyone in the on-

line directory, the user simply clicks on the person's name from a PC or spells the name using a telephone key pad. Users can easily communicate with anyone in their on-line directory without having to keep track of multiple phone numbers and other contact information.

5 Each user may receive a personalized public home page on the Internet which is simple to configure and which serves as virtual receptionist to the world. The public page may be turned on or off by the user and may contain a wide array of information which the user chooses to place on the page. The user can select the most convenient way for people to contact them at any time. Real time messages, for example, can be sent to the
10 user by simply clicking on the "contact-me-now" button. Users may publish their name, address, contact information, automated street level maps and/or driving instructions, and direct access telecommunication and e-mail functions. If selected, direct e-mail, pager, and fax links can be placed on the public page giving Internet users a simple way to find the user and contact him or her directly from the Internet. In addition memos and a voice
15 greeting can be placed on the public page making it a personal message board to the world.

 Systems according to the present invention can provide all users direct access to news, sports, financial, travel and other custom content directly from their PC or from any telephone. After using a PC to select and customize the content the user desires, the
20 content can be linked directly to the public page and is made available from any touch tone telephone.

Accordingly, an object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating communications and messages across one medium or across various media to and from various persons.

- 5 Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating communications and messages which can be accessed via telephony or computer.

- Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating
10 communications and messages which are platform independent.

Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating communications and messages which manage communications over multiple media including, but not limited to, telephony networks and the Internet.

- 15 Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating communications and messages which manage communications over multiple media including, but not limited to, telephony networks and the Internet and may intelligently select one available medium over another to optimize communication efficiency.

- 20 Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating

communications and messages which provide cross media messaging capability for message broadcasts.

Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating
5 communications and messages in which the interface and functionality is network-based and platform independent.

Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating communications and messages in which the interface and functionality distribute
10 applications and system functionality so that resources may be allocated in the system flexibly and reliably using Internet or other distributed protocol and techniques.

Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating communications and messages in which the generation of message broadcasts and
15 conference calls is greatly simplified.

Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating communications and messages in which one portion of the interface may be dedicated to an individual user and a second portion of the interface may be accessible to the public,
20 thereby allowing members of the public to contact the user or access information provided by the user.

Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating communications and messages in which one portion of the interface may be dedicated to an individual user and the user may customize that portion so that information resources
5 may be accessed directly from that portion.

Another object of the present invention is to provide integrated interfaces, functionality and processes for managing, generating, accessing and manipulating communications and messages which may be implemented in conjunction with existing computer telephony based message server systems.

10 Another object of the present invention is to provide an Internet or other network based graphical or computer interface to existing or new computer telephony systems.

Another object of the present invention is to provide computer network (Internet or otherwise) access to individuals' telephone numbers, pagers, fax machines and other devices which allow the Internet user to contact individuals in real time using the
15 computer network.

Other objects, features, and advantages of the present invention will become apparent with reference to the remainder of the written portion and the drawings of this document.

Brief Description of the Drawings

20 FIG. 1 illustrates one embodiment of a system for managing, generating, accessing and manipulating communications and messages in accordance with the present invention.

FIG. 2 illustrates the universal mailbox portion of the system of FIG. 1.

FIG. 3 illustrates the telapp of the system of FIG. 1

FIG. 4 illustrates the interface portion of the system of FIG. 1.

FIG. 5 illustrates the network management system file system organization of the
5 system of FIG. 1.

FIG. 6 illustrates the object, structure, and information flow of the system of FIG.
1.

FIG. 7. illustrates the structure of a second embodiment of a system for managing,
generating, accessing and manipulating communications and messages in accordance
10 with the present invention.

FIG. 8 illustrates a process by which the system of FIG. 7 can initiate a telephone
action.

FIG. 9 illustrates a process by which the system of FIG. 7 can initiate an Internet
action.

15 FIG. 10 illustrates one form of communication structure and applications
development structure of the system of FIG. 7.

FIG. 11 illustrates a user screen interface which can be generated by the systems
of FIGS. 1 and 7.

FIG. 12A illustrates an alternative embodiment of the screen of FIGS. 11.

20 FIG. 12 illustrates the configuration screen of the screen interface of FIG. 11.

FIG. 13 illustrates the personal page configuration screen of the screen interface
of FIG. 11.

FIG. 13A illustrates the default configuration screen accessed via the screen of FIG. 13.

FIG. 13B illustrates a billing screen of the interface of the system of FIGS. 1 and 7.

5 FIG. 13C illustrates the configuration selection screen of the interface of the system of FIGS. 1 and 7.

FIG. 14 illustrates a portion of the screen of FIG. 13 in which WWW hyperlinks may be entered.

10 FIG. 15 illustrates a portion of the screen of screen 13 in which a personal memo may be entered.

FIG. 16 illustrates the personal page generated by the interface screens illustrated in FIGS. 13-15.

15 FIG. 17 illustrates a configuration screen of a screen interface which may be generated by the systems of FIGS. 1 and 7 and in which addressing groups may be selected.

FIG. 17A illustrates the group editing option screen of the interface of FIG. 17.

FIG. 17B illustrates the group creation option screen of the interface of FIG. 17.

FIG. 17C illustrates the message creation screen of the interface of FIG. 17.

20 FIG. 18 shows a screen portion of the screen of FIG. 17 in which the information relating to addressing groups may be edited.

FIG. 19 shows another portion of the screen of FIG. 18.

FIG. 20 illustrates a configuration screen of a screen interface which may be generated by the systems of FIGS. 1 and 7 and in which individual persons' contact information may be selected and edited.

FIG. 20A shows an "Add Name" accessed via the screen of FIG 20.

5 FIG. 21 illustrates a personal inbox screen of a screen interface which may be generated by the systems of FIG. 1 and 7.

FIG. 22A illustrates a screen displaying an e-mail message accessed via the personal inbox screen of FIG. 21.

10 FIG. 22B illustrates an alternative embodiment of a screen displaying an e-mail message accessed via the personal inbox screen of FIG. 21.

FIG. 23A illustrates a screen showing a fax message accessed via the personal inbox of FIG. 21.

FIG. 23B illustrates an alternative embodiment of a screen showing a fax message accessed via the personal inbox of FIG. 21.

15 FIG. 24A illustrates a screen showing a voicemail message accessed via the screen FIG. 21

FIG. 24B illustrates an alternative embodiment of a screen showing a voicemail message accessed via the screen FIG. 21

20 FIG. 25A illustrates a contact screen of a screen interface which may be generated by the systems of FIGS. 1 and 7 and by which messages may be distributed to individual or group contacts.

FIG. 25B illustrates a contact screen of a screen interface which may be generated by the systems of FIGS. 1 and 7 and by which messages may be distributed to individual or group contacts with an area in which to enter the recipients address.

FIG. 26 illustrates a contact screen of a screen interface which may be generated
5 by the systems of FIGS. 1 and 7 and by which conference calls may be established.

FIG. 27 illustrates the screen of FIG. 26 once a conference call has been established.

Detailed Description of the Drawings

10 FIG. 1 shows one embodiment of a system 10 for managing, generating, accessing and manipulating communications and messages in accordance with the present invention. It should not be viewed as limiting, but rather to disclose in detail one particular way for carrying out the invention. The illustrative embodiment illustrated in FIGS. 1-6 reflects a system configuration driven by the desire to take advantage of the
15 hardware and capabilities of existing conventional telephony based messaging systems. As illustrated in FIGS. 7-10, another embodiment of a system according to the present invention may be provided which does not rely on conventional or existing infrastructure.

Referring to FIG. 1, telephony subsystem 12 of system 10 comprises many of the components of a conventional telephony-based universal mailbox system. Internet
20 subsystem 14 of system 10 comprises the components for providing the integrated interface through which telephony subsystem 12 may be accessed and information stored therein manipulated.

FIG. 2 illustrates telephony subsystem 12 of the system of FIG. 1. Telephony subsystem 12 comprises server 16, telephony application nodes (telapps) 18A-N, network manager 20, special purpose telephony nodes (telnodes) 22A-N and database 24. In the illustrative embodiment, server 16 is a Novell Server, consequently, communication among the elements of telephony subsystem 12 is via SPX, IPX or other desirable network protocol. Of course other networking standards and components could be employed, such as Microsoft NT or Unix based systems, in which case other protocols, including IP, could be used. Server 16, in combination with database 24, stores all of the messages delivered to any users as well as all information relating to user accounts for configuration control and billing purposes.

In the present invention, in order to provide Internet functionality to existing computer telephony systems, the inventors have replaced certain conventional telnodes with hardware nodes and telephone application nodes, or "Telapps." A primary reason for this approach is to provide a first platform which is primarily hardware-centric and a second in which the applications are made available to the hardware node across an Internet protocol or other suitable transfer protocol network. Telapps 18A-N manage Internet based system functionality according to the present invention such as voicemail, e-mail, and other media messaging and communications functions. Conventional telnodes 22A-N also continue to manage conventional computer telephony functionality such as provision of voice, e-mail, T1, and fax communications to system 10 via a conventional or other telephone switch.

As illustrated in FIGS. 1 and 3, hardware nodes 26A-N provide standalone hardware units. For instance, all communications boards, such as digital network interface (T1), fax, text-to-speech (TTS), conference, etc., may be transferred to hardware node 26A. Thus, telapps 18A-N are platforms for applications which access the hardware elements as necessary to implement functionality, such as control of call flow, TTS processing, etc. Telapps 18A - N communicates with hardware nodes 26A - N, for instance, through a suitable high level API for controlling call flow and telephony resources. A user communicates with telapps 18A-N to access and manipulate communications. Telapps 18A-N, upon receiving user commands, access applications which in turn access hardware on hardware nodes 26A-N to perform the desired functionality. All transactions are tracked from, and relevant information for each transaction is provided by server 16. Network manager 20 coordinates the interaction between telapps 18A-N, server 16 and, when used, specialized nodes 22A-N.

Hardware nodes 26A-N of the illustrative embodiment are Pentium® based SCO/UNIXWARE units with rack-mount passive backplane systems (such as those with an SCSA bus) populated with T1, voice, conference, fax, TTS, voice recording and voice recognition boards. The use of SCO/UNIXWARE is desirable in the illustrative embodiment because it allows compatibility between the UNIX network file system (NFS) used in Internet subsystem 14 and the Novell proprietary file system (which supports NFS) employed in telephony subsystem 12. Hardware node 26A will be completely configurable based on the boards that are populated therein.

A benefit of dividing the resources among telapps 18A - N and hardware nodes 26A - N is to allow the platforms to become independent of the DOS environment, be supported by industry standards such as UNIX, and increase scalability. The functionality split also serves to eliminate the need to transfer calls through the switch and coordinate function of the net manager 20 eliminating cost, time consumption and inefficiency associated with providing conference, fax, TTS, and other features during a call. The functionality split also provides a method for allowing a conventional telephony subsystem to communicate with an Internet-based subsystem thereby enabling the interface according to the present invention. In other words, an existing system, with established telephony capability, a customer base and an established database can easily be integrated with a computer communications network, such as the Internet, without losing the benefit of those valuable assets.

FIGS. 4 and 5 illustrate Internet subsystem 14 of system 10, which comprises web manager 28, DB server 30, database 32 and encoder 34. All communications within Internet subsystem 14 is via IP protocol. Web manager 28 communicates with hardware nodes 26A-N via IP protocol. Web manager 28 communicates with server 16, however, via IPX protocol since server 16 is on the existing computer telephony Novell net. Web manager 28 acts as the conduit for all communications between telephony subsystem 12 and any processes which utilize the Internet or communicate via TCP/IP. Web manager 28 also acts to coordinate and synchronize all databases in system 10.

DB server 30 stores all of the information required for operation of the Internet related functions of system 10. Server 30 holds all information necessary for the Internet

interface of system 10, including messages, contact data, customer records, etc. Server 30 is kept synchronized by web manager 28 which coordinates with telapps 18A-N. Web manager 28 also keeps the files stored on server 30 in synch with those stored on server 16. Also, server 30 stores all of the messaging information for the messages stored on the system for a user. In other words, although the message itself is stored on server 16, descriptive information regarding the message, such as time received, return address, etc. may be generated and stored on server 30 for access via a graphical interface as described more fully below. Database 32 is a storage system for data stored by server 30 and in the illustrative embodiment comprises an Informix database. Encoder 34 is responsible for converting file formats of information sent out or received so that it is compatible for its ultimate use.

Server 30 serves as centralized storage for subsystem 14. Web manager 28, e-mail server 36 and encoder 34 may refer to files thereon regardless of on which platform they reside. Voice mail, fax and other customer data stored on server 16 may be mirrored on server 30.

Web manager 28 handles the transfer of files from server 16 to server 30 upon command from telapps 18. E-mail server 36 stores new e-mails on server 30 and inserts a message record in database 32, which makes it accessible to the Internet interface process which require the information so that it may be displayed to the user. In order for telapps 18 to access the message, the e-mail directory may be mapped to as a shared directory with server 16. Telapps 18 query web manager 28 in order to query server 30 for a given user's list of e-mail messages.

As illustrated in FIGS. 1 and 6 (which illustrates the object structure of the system of FIG. 1), it can be seen that system 10 comprises two primary elements - an Internet communications system (Internet subsystem 14) and a telephony system (telephony subsystem 12). Both of these elements draw on hardware nodes 26A-N for hardware resources used in performing services required by the user. Web manager 28, in addition to managing the Internet functions, manages the communication and cooperation of the telephony and Internet portions to create the desired functionality of the present invention. Thus, when a message, such as an e-mail message, arrive via the Internet addressed to a user, the message is delivered from web manager 28 to servers 16 and 30. The message itself is stored on server 16, while information identifying the message and its location on server 16 are generated by web manager 28 and stored on server 30. Server 30 has the drive of server 16 mounted via NFS. Thus, database 46 is a single shared disk which is accessed from the IPX/DOS nodes (such as telapp 18) as a Netware Directory and from the IP/UNIX nodes (such as web manager 28) as an NFS mounted directory. The one directory is shared by two different means for different types of clients or nodes. If a user accesses the message via the Internet connection, appropriate information may be forwarded to server 16 and on to net manager 20 which operates node 22A to generate a bill for the user.

The information stored on server 30 may then be displayed to the user via a visual display on a computer connected to web manager 28 over the Internet. In other words, a user may install a web browser on his or her computer. By accessing the Internet and his or her account with system 10 therethrough the user can manipulate his or her messages

and generate and deliver new messages. No interface software need be installed on the user's computer as the interface is a network application made available by the web manager and is compatible with web browser protocols. Thus, regardless of what type of computer is used by the user he or she will see a consistent interface (provided, of course, 5 that the computer has a web browser installed thereon). An illustrative example of an interface of the present invention is discussed below with reference to FIGS. 11-27. Alternatively, a user may request, via telephone commands to network 12 such as through telapps 18, that the message be converted to voice mail, in which case the telapps will retrieve the message from server 16 and direct it to hardware node 26A where it is 10 converted per the user's command. The message, in its new form is then delivered to the user over the telephone line.

In another example transaction, a fax message may be delivered to the user via a telephone line. As before, the message itself is stored on server 16, while identifying information is stored on server 30. If the user commands the fax to be delivered via 15 telephony, it is retrieved by the telapps 18 which forward it to hardware node 26, whereupon it is sent out over the telephony network to the desired address (phone number). If the user wishes to look at the fax via the Internet interface, telapps 18 retrieve the message and forward it to hardware node 26A which converts the fax to a bitmap image which can be displayed as desired.

20 A user may also perform mass communications through one or more media. For example, a user, accessing the system via the Internet, may wish to deliver a text message to one or more recipients. The user creates the message in the interface program and

addresses the message to various recipients. The user can indicate which medium is to be used for each recipient. Assuming that three recipients are selected, one to receive a voicemail version, one to receive an e-mail version and one to receive a fax version, the process is implemented as follows. The e-mail version is sent directly through the web to
5 the intended recipient and a marker is forwarded to NFS share database 46. When database 46 and database 24 are synchronized by web manager 28, the transaction is logged to the billing system for billing to the user. Both the voice mail and fax messages are sent, in text form, to telapps 18 which accesses hardware nodes 26 to convert the text to a bitmap (for faxing) and to speech (for voice mailing). Once the files are converted,
10 telapps 18 direct hardware nodes 26 to deliver the messages via the telephony network. The transactions are logged in database 24 for billing purposes.

If the user, accessing system 10 through the Internet, wishes to conduct a conference call, he or she accesses a portion of the interface which allows the selection of intended conferees. Once the conferees are selected, web manager 28 notifies telapps 18
15 of the need for conference telephony. Telapps 18 access the conference call hardware, which may be resident on hardware node 26 or on a specialized node 22. The hardware establishes the connection with each of the conferees and the connection is routed to the user's computer (which is configured to allow audio communication) and the conference call takes place. Again, the transaction is logged to database 24 for billing purposes.

20 These features may be accessed via telephone as well. For most functions, none of the commands or messages need be routed through any portion of Internet subsystem 14. Of course, any information routed to an Internet address or recipient will be routed

appropriately. For instance, a user may wish to deliver a fax to a recipient's e-mail address. The fax is sent through the telephony system, converted to an e-mail attachment and forwarded by web manager 28 to the recipient's e-mail address. Conversion may be performed by encoder 34 which encodes the fax to its final form, such as a GIF image,
5 text (using optical character recognition), etc., and e-mail server 36 or web manager 28 may attach the file (in its final format) and send it as an e-mail. The same process is also used for encoding and e-mail attaching audio messages.

In this illustrative embodiment, all transactions are routed through telapps 18A-N, even if they are wholly Internet transactions, primarily because billing functions are
10 performed in telephony subsystem 12.

As illustrated in FIGS 7-10, in an alternative illustrative embodiment, system 10 may be implemented with systems independent of conventional telephony systems.

System client 38, or service, uses library 40 which resides on the local host on which the application runs. A service may be transient or permanent. Transient services
15 are applications which are invoked to perform some task, and which terminate on completion of that task. Examples of such services would be a CGI script that faxes the input from a HTML form to a specific number. Permanent services are services that are always running, and which respond to events. Those events invoke some sort of action. Examples of such services include a service which answers calls on a given range of
20 DNIS values. This application can handle from 0 to the maximum number of channels worth of calls. The service starts up, initializes and registers itself, and waits for an event - an incoming call. Another example would be a process that handles all audio file

encoding/conversion for a machine. This process waits for an event, an audio file that requires encoding, and responds by encoding the file.

Services may or may not require the telephony resources managed by server 42; they may simply perform a task for other services. And it is for this purpose that services
5 may communicate with one another through the computer telephony interface ("CT/I") API with *peer messages*.

Any desired Internet or other distributed transfer protocol (here, simply for shorthand reference called, "Computer Telephony Transfer Protocol" or "CTTP") allows access of the library 40 functions by the Server 42 and vice versa. CTTP is an application
10 layer protocol which can use TCP/IP as transport. The protocol itself need not be defined since the API allows for the abstraction of all communication between the CT/I Service and the CT/I Server.

Each service 38 can have a distinct connection to server 42. Server 42 may have connections to multiple client applications, and a service may even connect to multiple
15 servers 42. Anything having to do with the actual connection to server 42 is hidden from service 38 through API 40.

The client/server relationship allows for very complex and diverse computer telephony related applications for intranets as well as for the Internet. The model allows for resource sharing between servers on a network. It gives the application developer an
20 abstract view of their servers 42 (as well as other servers) with disparate hardware and operating systems, as resources providing specific function and generating specific events

- all handled through a single API. It allows applications 38 (the services) to run locally or remotely.

Under this architecture server 42 is highly scaleable in that it can be a complete system unto itself for small operations - it could contain a database, web services, and call
5 flow applications, or it may be several servers 42, all performing no other function other than managing telephony resources and outsourcing the actual applications to other machines on the network.

Example of Services 38 include:

- An application that waits for an incoming fax on a predetermined 800 number, and
10 which encodes the fax from the .TIF image format to .GIF and posts it to the web.
- A CGI script that places an outbound call, page and fax notifying the recipient of the fields filled out in the HTML form.
- An E-Mail reader application with the capability to respond with an audio message to the sender.
- 15 • A telephone web browser which allows the user to select a URL, and which reads the corresponding document using text to speech functionality.
- An audio encoding process which waits for a peer message that transfers the audio file, and then encodes the audio file into the appropriate format.
- A web based application generator written in Java or other applet inclusive language
20 that allows a user to map out a call flow and then assign that call flow to run on a specific 800 number.

API 40 allows services 38 to communicate with one another using peer messages.

This allows distributed processing which offers several advantages:

- Applications which control call flow can send messages to another service (a helper service) to perform a function that may block (a database call for example). This
- 5 keeps the call flow application in control of the call at all times, and greatly reduces latency.

Operations which take a lot of processing power or which need to run on specific operating systems can be accessed through peer messaging from a call flow application running on separate machines.

- 10 Users may also extend API 40 to include their own functions. These functions are wrappers for peer messaging, which allow the user to provide their own API functions and events to their services. An example of such an extension would be the addition of a function `cti_email(email_address, audio_file)` which mime encodes the audio file and attaches it to an e-mail message which is sent to the given e-mail address. This function
- 15 would receive an event indicating, at a minimum, success or failure. This function may actually do nothing more than send a peer message to the delivery service and deliver the responding peer message as an event to the calling service. In fact, standard services may also be added to the API to provide functions such as audio and graphic file encoding/conversion.

- 20 The CT/I Server program forks into a Communications Server and a computer telephony "CT" Resource Manager. The Communications Server binds to a port and listens for incoming connections. When a client program (a CT/I service) connects to the

port, the Communications Server forks off a relay process that attaches the client to the CT/I Resource Manager through a pipe. When the CT/I service quits, the forked relay process also quits and returns the pipe to the Communications Server for use by another service.

- 5 The CT Resource Manager process contains the main event loop. Events from the telephony hardware spur signals to the client programs, and commands from the client programs trigger function calls to the CT hardware through the vendor specific API.

- The CT/I Server serves as the glue binding these two interfaces (Communications Server and the CT Resource Manager). The CT/I API (ti_* functions and events) is a
10 hardware independent API through which the CT/I service can control call flow, fax, page, etc. Each distinct CT platform (Dialogic, NMS, conversant, etc.) has its own set of corresponding hw_* events and related events. These functions and events correspond directly to the similarly named CT/I API functions.

- The CT/I API is a library which may be written in C or other suitable language
15 that can be compiled into a client program on any machine on the Internet, and from the remote client program can attach to the CT/I server and handle a multitude of calls. The CT/I API functions are designed to be easy to use, so that client application programs can be written by programmers without specific knowledge of the intrinsics of the specific CT platform and API. The ti_* functions are asynchronous and will not block, so a client
20 program can handle multiple connections at once. Some of the CT/I API functions are listed below:

```
int*ti_initialize(name,host,port,digit_event_mode);
```

```
char *name;  
  
char *host;  
  
int port;  
  
int digit_event_mode;
```

5

Description:

ti_initialize initiates a connection to a dispatch server running on a Dialogic™ host. The client must also provide a string identifier name by which the dispatcher will know the client. host is a string which identifies the host machine, for example "dialog.tc.net". port is an integer that specifies the port number on the host machine. digit_event_mode is an integer which specifies how dtmf digit events are reported to the client; a value of 0 puts the connection into immediate single-digit reporting mode. If digit_event_mode is non-zero, the connection is put into digit-block request mode. ti_initialize returns a pointer which is the "handle" used for further communication with the dispatch server.

15

Events:

```
event_connect, subevent_incoming  
  
event_disconnect, subevent_incoming  
  
event_digit (if digit_event_mode is ON)
```

20

```
struct ti_event*ti_wait_event(conn,timeout);
```

```
int conn;  
  
struct timeval timeout;
```

Description:

5 `ti_wait-event` waits for a duration of timeout for an event. `conn` specifies the
handle of a dialogic dispatch server (returned by `ti_initialize`). If an event is obtained, the
event structure referenced in the return value will specify the details of the event. If no
event was obtained before timeout microseconds elapsed, a NULL pointer is returned.
The event structure is composed of a major number, a minor number, and an auxiliary
10 pointer.

Events:

```
event_ring, event_connect, event_disconnect  
  
subevent_incoming  
15        subevent_outgoing  
  
event_digit  
  
subevent_dtmf, subevent_mf, subevent_pulse  
  
aux = digit string  
  
event_play_done  
20        subevent_EOF  
  
subevent_digit  
  
event_record_done
```

```
        subevent_maxtime
        subevent_maxsilence
        subevent_digit
    event_prompt_done
5        subevent_maxdigits
        subevent_finaleigit
        subevent_maxtime
        subevent_maxsilence
        aux = digit string
10    event_peer_message
        aux = message

void ti_event_timeout(conn,channel,major,timeout);
    int *conn;
15    int major;
        struct timeval *timeout;
```

Description:

ti_event_timeout requests notification if, after timeout, a specific event is not
20 received. If the event is received before timeout, the event_timeout request is canceled.
If the event is not received before timeout, then the specific event is generated with a

minor event identifier of subevent_timeout. conn specifies the handle of a dialogic dispatch server (returned by ti_initialize).

Events:

5 event_*,subevent_timeout

void ti_play(conn,channel,filename,interruptable_by_digit);

int *conn;

int channel;

10 char *filename;

int interruptable_by_digit;

Description:

ti_play plays the audio file filename over a desired channel. The format of the
15 audio file is automatically determined from either the filename extension, or the first few
bytes of the file. conn is the connection handle of a dialogic dispatch server (returned by
ti_initialize). If interruptable_by_digit is non-zero, then the play operation can be
interrupted by a digit event. ti_stop_io() may be called to interrupt the playing process.

20 Events:

event_play_done,subevent_EOF

event_play_done,subevent_digit

```
void ti_record(conn,channel,filename,maxtime,maxsilence,int_by_digit);
```

```
    int *conn;
```

```
    int channel;
```

```
5    char *filename;
```

```
    long maxtime;
```

```
    long maxsilence;
```

```
    int int_by_digit;
```

10 **Description:**

ti_record creates an audio file **filename** with data from a desired channel. The recording process continues until **ti_stop_io()** is called, or until **maxtime** milliseconds have elapsed, or until **maxsilence** milliseconds have elapsed, or until a digit event occurs (if **int_by_digit** is nonzero). **conn** is the connection handle of a dialogic dispatch server
15 (returned by **ti_initialize**). If **maxtime** is zero, then the recording time is unlimited. If **maxsilence** is zero, then silence will not stop the recording. If **int_by_digit** is zero, then a digit event will not stop the recording.

Events:

20 **event_record_done,subevent_maxtime**
 event_record_done,subevent_maxsilence
 event_record_done,subevent_digit

```
void ti_prompt(conn,channel,filename,interruptable_by_digit),  
max_digits,final_digit,initial_timeout,idle_timeout);  
  
    int *conn;  
5    int channel;  
  
    char *filename;  
  
    int interruptable_by_digit;  
  
    int max_digits;  
  
    int final_digit;  
10    long initial_timeout;/*milliseconds*/  
  
    long idle_timeout;/*milliseconds*/
```

Description:

ti_prompt plays the audio file filename over a desired channel. The format of the
15 audio file is automatically determined from either the filename extension, or the first few
bytes of the file. conn is the connection handle of a dialogic dispatch server (returned by
ti_initialize). If interruptable_by_digit is nonzero, then the play operation can be
interrupted by a digit event. After the play is completed or interrupted, a digit block of
max_digits is expected. If no digits are received after initial_timeout milliseconds, or
20 after a special digit final_digit is received, or after an idle (silence) time of idle_timeout
milliseconds after one or more digits were received, a digit block event is returned.
ti_stop_io() may be called to interrupt the prompting process.

Events:

event_prompt_done, subevent_maxdigits
event_prompt_done, subevent_finaleddigit
5 event_prompt_done, subevent_maxtime
event_prompt_done, subevent_maxsilence

void ti_speak_string(conn, channel, text, interruptable_by_digit);

int *conn;
10 int channel;
char *text;
int interruptable_by_digit;

Description:

15 ti_text_to_speech_string converts the string text into a voice signal which is
output over channel. conn is the connection handle of a Dialogic dispatch server returned
by ti_initialize). If interruptable_by_digit is nonzero, then the speech can be interrupted
by a digit event.

20 void ti_speak_file(conn, channel, filename, interruptable_by_digit);
int *conn;
int channel;


```
char *filename;  
  
int interruptable_by_digit;
```

Description:

5 **ti_text_to_speech_file** converts the text file **filename** into a voice signal which is
output over channel. **conn** is the connection handle of a dialogic dispatch server returned
by **ti_initialize**). If **interruptable_by_digit** is nonzero, then the speech can be interrupted
by a digit event.

10 **Events:**

event_speak_done

```
void ti_stop_io(conn,channel);
```

```
int *conn;
```

15 **int.channel;**

Description:

ti_stop_io stops all play, record, and **get_digit_block** operations on channel. **conn**
is the connection handle of a dialogic dispatch server (returned by **ti_initialize**).

20

Events:

(none)

void ti_hangup(conn,channel);

int *conn;

int channel;

5

Description:

ti_hangup disconnects the call on channel. conn is the connection handle of a dialogic dispatch server (returned by ti_initialize).

10 **Events:**

event_disconnect, subevent_incoming

event_disconnect, subevent_outgoing

void ti_exit(conn);

15 int *conn;

Description:

ti_exit disconnects the client from the dialogic dispatch server. conn is the connection handle of a dialogic dispatch server (returned by ti_initialize).

20

Events:

(none)

```
void ti_die(s);  
  
char *s;
```

5 Description:

ti_die prints the error message s, prints a perror message, and exits the client program abnormally with an exit value of -1.

Events:

10 (none)

FIGS. 11-27 illustrate various aspects and functionalities of an illustrative embodiment of an Internet interface presented to a user of system 10. Because of the myriad of combinations of communications media and message distribution options, it is impossible to catalog each and every possible function that may be performed via the present invention. The following description identifies many options for generating, accessing, manipulating and delivering messages and information via system 10; however, many other capabilities and functionalities may be added or included in such a system which take advantage of the integration of telephony and computer network capabilities and function.

The interface may allow a user to provide information about himself or herself (including how s/he may be contacted), information about his or her communications

preferences, and information about individuals and groups with whom s/he plans to communicate. These communication preferences may be configured by selecting certain options that define rules to be applied to inbound and outbound communications. For example, the user may request that inbound voice messages be forwarded to an e-mail mailbox for later viewing. Alternatively, the user may request that e-mail messages be forwarded to a voice mailbox for later retrieval. The user may also request pager notification any time s/he receives a new e-mail message. This cross-media messaging and notification feature of the present invention (which are provided by the message servers) automatically perform as part of the forwarding operation any reformatting or conversion of messages that may be required.

Computer access to inbound voice, fax, and e-mail communications is provided through a series of personal, secure Web pages. FIG. 11 shows a screen shot of a login page which can be generated by a system 10 according to the present invention. In this example, the Netscape Navigator Web browser is used to access the Web site through which the features and functionality of the present invention are provided. The Web site may be accessed through a Uniform Resource Locator (URL) such as "http://www.tc.net/pc3" or "http://www.premierecomm.com" 70. At this page, the user may be asked to provide a login identifier (such as a name) 72 and a password 74. Alternatively, as shown in FIG. 11A, the screen of FIG. 11 may include button by which destinations within the interface may be selected.

FIG. 12 shows a screen shot of a configuration management page. Information line 80, identifies the user, his or her location, the date and time, and an indicator of the

current task (e.g., Configuration). Tab 82 also indicates the current task. From the main configuration management page, the user may select one of several options as indicated by the buttons on page 84. The user may also select one of the buttons at the bottom of page 86.

5 FIG. 13 shows a screen shot of a personal contact information page. The user provides contact information such as a telephone number, a pager number, fax number, and e-mail address by completing the fields in form 90. The user may also provide a preferred contact method such as e-mail 92. As shown in FIG. 13A, the user may also configure his or her default contact information. Referring to FIG. 14, the user also may
10 provide in additional fields URLs in field 100. These URLs on "hyperlinks" will provide links to other Web sites through which s/he may be contacted directly. By completing field 110, a user may provide street maps and driving instructions that may be useful to other users (not shown). Referring to FIG. 15, the user may enter a short memo 110 - for example, regarding his or her plans for the day.

15 The user may also access account information as illustrated in FIG. 13B. As shown in FIG. 13C, a user may have several different configuration for varied personal scenarios, i.e., vacation, travel, etc., which will result in different setups specific to those needs.

 In addition to providing the personal contact information (so inbound messages
20 may be routed properly), the URL information, and the memo, the user may indicate whether s/he would like any or all of the information he provided (e.g., name, address, contact information, street maps, driving instructions, etc.) to appear on a "Virtual

Receptionist" Web page. The "Virtual Receptionist" Web page provides personal contact information for an individual user and may be accessed by other users of the present invention or other Internet users so they may contact the individual preferably, by simply selecting a "contact-me-now" button. FIG. 16 shows an example of a "Virtual

5 Receptionist" Web page. The page contains the same personal contact information provided by the user, but reformats it so other users may easily find the information and interact with the page through the buttons and links appearing on the page.

In addition to providing personal contact information, a user of the present invention has a personal on-line directory in which to store and organize the names,

10 addresses, telephone numbers, pager information, notes, and other data regarding the individuals with whom the user communicates regularly. These individuals may provide their own personal contact information so that they may be contacted according to their own personal preferences. At the on-line directory, an individual may be contacted by simply selecting the individual's name from a list. A user may also define groups of

15 people with whom he communicates frequently. The user may send the same communication to each person in the group simply by selecting the group name from a list of groups. Members of the group who have provided their own personal contact information may then receive the communication according their preferred communication method.

20 FIG. 17 shows a screen shot of an on-line directory page. Initially, the user is presented with the list of groups 120 s/he has defined previously and the list of individuals (Contacts) 122 with whom s/he communicates. In addition, the user is

presented with options 124 for managing the Groups and Contacts. For example, the user may add or delete names for either list (see FIG. 17A for group editing screen), add or remove entire groups (see FIG. for screen configuration for group creation option) or create a message for a selected group (see FIG. 17C for message screen). FIG. 18 shows

5 a screen shot of an "Add Name" page. After selecting the group to which the user would like to add a name (e.g., Sales Group) 130, a form for adding a new name is presented 132. Referring to FIG. 19, the form 140 continues so contact information for reaching the individual through a variety of methods may be provided (e.g., more than one office number, fax number, home phone number, pager number, e-mail address, cellular phone

10 number, etc.). FIG. 20 shows a screen shot of a Contacts page for individuals. Information regarding individuals with whom the user communicates 150 may be provided by completing an "Add Name" form as shown in FIG. 20A. A user may communicate easily with anyone in his on-line directory without having to keep track of multiple phone numbers and other contact information.

15 FIG. 21 shows a screen shot of a message center screen or page or "personal inbox." All of a user's communications - regardless of the type - may be accessed through the personal inbox. Preferably, the page lists in field 160 the type, time, date, sender, and subject of each communication that has been addressed to the user. Additional information may be accessed from this page by selecting one of the buttons

20 162 at the bottom of the page. As the user selects each communication, a communication display page for the individual communication is presented. The communication display page changes based on the type of message.

FIG. 21 show the message center screen of the interface. Message Center is intended to be the default location for the interface. The principle sections of this layout (which are analogous to the layout of other screens of the interface, are as follows:

Sidebar 161 - on the left of the screen is a side bar consisting of three tabs labeled
5 Inbox, Contact, and Configure. By pressing on any one of these three tabs, the program opens up to the corresponding interface for that action.

Work Area 160 - The large center section is work area 160. There is a default work area for each of the primary sections. Within the work area appears content appropriate for the section of the program that is active (i.e., messages in the Inbox, faxes
10 in the fax viewer, names in the Contact Manager, etc.). The Work Area can contain hyperlinks that call other sections of the program depending on current status. The current work area determines the current function bar.

Function Bar 163 - On the top of the browser's display area is the function bar. It contains the Exit button which will shut down the program, and leave the user at an
15 Exist screen (which may show advertising, account status information, or may be a return to Licensee's content). In addition it will contain several buttons whose functions are determined by the current Work Area (i.e., the Inbox Area will have related function buttons such as Forward Reply, etc.). The Function buttons call actions which effect their specific work area's content. The Exit button will be common to all Function bars in all
20 screens of the interface.

Status Bar 164 - Just below the Function bar is the Status Bar - by default it indicates the User's name, the current date, and the time as of the most recent refresh.

The Status bar could also potentially include any combination of the following: Banner Advertising, Stock Ticker, News or Sports wire, License specific content, etc.

Menu Bar 165 - At the bottom of the browser's display area is the Menu bar.

- The Menu Bar contains link buttons 162 for various Work Areas to be displayed. The
- 5 Menu bar is determined by the sidebar tax - each of the tree primary sections has only one related Menu bar (i.e., the Menu bar for the Inbox contains buttons for each of the content sections of the Inbox). In addition the Menu Bar contains links to an Audio Tip (a streaming audio file giving a tip or hint for ease of use in the current section) and Help (a separate html section giving detailed help on how to use the interface. Help are available
- 10 from every Menu bar of all screens of the interface. The buttons corresponding with each work area shall appear highlighted when that button is selected.

The message center is the first primary section. It delivers inbound messages to the user, and allows the user to respond to and re-direct those messages. Messages may be in the following forms.

- 15 **Fax** - A Fax, .tif file converted to one or more .gif files for viewing on the web.
- E-mail** - Standard E-mail - attachments will appear as download links.
- Voice Mail** - A voice message that has been digitally encoded and electronically delivered.

- The message center is also the section which delivers customized content to the
- 20 user. For example, content may consist of any one or more of the following:

Sports - linking to a Sports provider such as ESPN.

News - linking to a news provider such as CNN.

Weather - linking to a Weather provider such as The Weather Channel.

Travel - linking to an airline or other Travel service such as Delta

Stocks - linking to NASDAQ or Quote.com

Of course, other information providers may also be included:

- 5 Menu Bar 165 for the message center contain links to any of the above content as determined by the users configuration. There is also a link to the incoming Message (Inbox). Each of the content links brings it's corresponding content into the interface frameset, in the frame set aside for the Work Area.

- The Messages will be displayed in a Work Area in a table sorted by arrival time of
10 the messages wit the most recent at the bottom. Each Message will occupy a row in the table indicting the following:

1. Type of message 166A - Fax, Voice Mail, or E-mail. This will be indicated by a graphic, which will also be a link to a message viewing Work Area for that particular type.
- 15 2. Time of Arrival 166B
3. Date of Arrival 166C
4. Sender 166D (for E-mail) or phone number (for fax)
5. Subject 166E (for E-Mail, # of pages for fax)
6. Select Box 166F- that is used to indicate if a particular message or group of
20 messages is tagged to be acted on by a function.

Function bar 163 is inactive when custom content is displayed. When the Messages are displayed, the following functions are available:

1. Refresh 167A- Checks the server for any new messages and redraws the screen.
 2. Select All 167B - Selects all messages to be acted on.
 3. Deselect all 167C - De-selects all messages.
 4. Download 167D - forwards all selected files as E-mail attachments to an E-mail
5 address pre-configured by the user. A user may, as an option, choose to have all
transferred messages, removed from the server.
 5. Delete 167E - Deletes all selected files from the server (the files may be expunged
immediately, or as part of the Exit process).
 6. Exit 167F - exits system.
- 10 As shown in FIGS. 22A-B, an e-mail message may be displayed in a scrolling text
window 170. The user may then reply to the message, store it, or forward it by selecting
one of the buttons at the bottom of the page 172. FIGS 22A-B show screen shots of the
E-mail viewer portion of the interface. By clicking on the image used to indicate an E-
mail message in the Inbox Message Work Area 160, a new Work Area 170 and Function
15 bar 171 are called. Sidebar 161, Menu 165 and Status bar 164 may remain the same.
Alternatively, Menu bar 165 may call additional buttons for accessing and manipulating
messages. The new Work Area 170 is the E-mail viewer which contains the header and
body of the corresponding E-mail message.

Available Functions for the E-mail Viewer are:

- 20
1. **Forward** - this commences a forward mail sequence allowing the user to re-direct
the E-mail with an added memo.
 2. **Reply** - similar to Forward, but directed specifically to the sender.

3. **Download** - send the current E-mail to a pre-configured E-mail address. The message may then be removed from the server or returned in fax or message.
4. **Delete** - delete selected E-mail from server with Confirmation Dialog (e.g. Are you sure?) return to Messages Work Area.
- 5 5. **Next Message** - Jump to next Message in chronological queue (may require shifting to another type of message viewer)
6. **Previous Message** - jump to previous Message in chronological queue (may require shifting to another type of message viewer).

These functions may be provided as buttons on function bar 171 or menu bar 165 or other
10 desirable locations on the screen.

As shown in FIGS. 23A-B, a fax message may be displayed as a graphical image (e.g., TIFF image) in a scrolling window 180. In addition, the fax message may be printed or forwarded by selecting a button and entering a fax number in a form field.

FIGS. 23A-B show screen shots of the fax viewer portion of the interface. By
15 clicking on the image used to indicate a Fax message in the Inbox Message Work Area 160 (FIGS. 21A-B), a new Work Area and Function bar are called (Sidebar 161, Menu 165 and Status 164 bars may remain the same). The new Work Area 180 is the Fax viewer which indicates all available information about the sender: Name (if caller ID is available). Time and Date, and number of pages in transmission.

20 Available Functions for the Fax Viewer are:

1. **Forward** - this will commence a forward mail sequence allowing the user to re-direct the fax with an added memo.

2. **Reply** - similar to Forward, but directed specifically to the sender.
3. **Download** - send the current Fax to a pre-configured E-mail address - the message may then be removed from the server or returned in fax or message.
4. **Delete** - delete selected Fax from server with Confirmation Dialog (e.g. Are you
5 sure?) return to Messages Work Area.
5. **Next Message** - Jump to next Message in chronological queue (may require shifting to another type of message viewer)
6. **Previous Message** - jump to previous Message in chronological queue (may require shifting to another type of message viewer).
- 10 7. **Next Page** - display next page of Fax (if any).
8. **Previous Page** - display previous page of Fax (if any)

These functions may provided in the menu bar 165 (FIG 23A) or in the function bar 163 (FIG. 23B) or other desirable locations on the screen.

- Information regarding an inbound voice mail message (e.g., date, time, sender's
15 number) may be displayed in a page as shown in FIGS. 24A-B. For computers equipped with a sound card, following selection of a button 190, a digitized voice message may be played back to the user. For computers without a sound card, the user may be given an 800 number to call to listen to the voice message. The voice mail message may then be saved, stored, or forwarded to individuals or groups.

- 20 FIGS. 24A-B show screen shots of the voice mail viewer portion of the interface. By clicking on the image used to indicate a Voice mail message in the Inbox Message Work Area 160 (FIGS. 21A-B), a new Work Area 191 and Function bar 163 are called

(Sidebar 161, Menu 165 and Status 164 bars may remain the same). The new Work Area 191 is the Voice Mail viewer which indicates all available information about the sender: Name (if caller ID is available). Time and Date of arrival, and length of message. The work Area will feature a DialWeb link and will have a RealAudio player embedded
5 therein which will both be used to call a ram file which will play the appropriate audio stream.

Available Functions for the Voice mail Viewer area:

1. **Forward** - this will commence a forward mail sequence allowing the user to re-direct the Voice mail with added memo.
- 10 2. **Reply** - similar to Forward, but directed specifically to the sender.
3. **Download** - send the current Voice mail to a pre-configured E-mail address. The message may then be removed from the server or returned in fax or message.
4. **Delete** - delete selected Voice mail from server with Confirmation Dialog (e.g. Are you sure?) return to Messages Work Area.
- 15 5. **Next Message** - Jump to next Message in chronological queue (may require shifting to another type of message viewer)
6. **Previous Message** - jump to previous Message in chronological queue (may require shifting to another type of message viewer).

These functions may provided in the menu bar (not shown) or in the function bar 163
20 (FIG. 23B) or other desirable locations on the screen.

In addition to retrieving inbound messages, the user may compose and send outbound messages. FIG. 25A shows an outbound message page where the message is a

reply (thus the user need not enter an address). FIG. 25B shows an outbound message page where the message is not a reply and must therefore be addressed. The user first selects the intended recipients by selecting one or more groups or individuals to whom the message may be sent 200. The user then enters the text of the message in a scrolling
5 window 202. The message may then be sent to each of the selected recipients by selecting one of the delivery modes appearing in the buttons at the bottom of the page 204. Using the "Preferred Delivery" option, the message may converted or reformatted according to the preferred communication method of the recipient, preferably upon retrieval of the message by the recipient.

10 In another aspect of the present invention, the computer interface may be used to place outbound calls - for example, conference calls. Referring to FIG. 26 to place a conference call, a user first selects a list of participants by selecting one or more of the groups and/or individuals from the Contacts list 210. The user then selects the conference call button 212 to establish the call. The user waits for his telephone to ring.
15 The user is informed of the status of the call through a page as shown in FIG. 27.

Another outbound messaging feature of the present invention that is available via the computer interface is fax broadcasting. To take advantage of this feature, the user simply enters the text of his fax message and provides a list of recipient fax numbers, preferably by selecting a group or individuals from his on-line directory. The message
20 and fax numbers are then forwarded to the telecommunications switch so the necessary calls may be made. For those recipients who prefer e-mail over fax messaging, the cross-media messaging feature of the present invention processes the fax message as an

attachment to an e-mail message so that the recipient may retrieve the message according to his or her preferred communication medium. Upon retrieval by the recipient, the fax message may be displayed as an image in a scrolling window. In another aspect of the present invention, the fax message may be sent as e-mail to any recipient who happens to
5 be logged in to the Web site of the present invention at the time the fax is sent. This approach may result in a significant cost savings as fewer phone calls are needed to deliver the message to the intended recipients.

In addition to using the computer interface to present invention, a user may access his personal on-line directory, his personal inbox, and his personal contact information
10 using a telephone. The same information that is available to the user via the computer interface is accessible to the user via the telephone interface. Therefore, the user is assured of access to his communications regardless of the interface he chooses at any given time. The user may also arrange for conference calling and fax broadcasting through the telephone interface. The telephone thus gives the user an alternative device
15 through which the features and functionality of the present invention may be accessed.

Although the invention is described in detail with specific reference to illustrative embodiments, it is not limited to those particular embodiments. For example, the configuration of the components that provide the features and functionality of the present invention may change and nevertheless fall within the scope and spirit of the present
20 invention. The scope of the present invention is defined by the following claims.

Claims:

- 1 1. A system for accessing, creating and managing communications and messages
2 comprising:
 - 3 a) a server;
 - 4 b) a first database in communication with the server;
 - 5 c) at least one telephone application node in communication with the server;
 - 6 d) at least one telephony node in communication with the server;
 - 7 e) at least one Internet node in communication with the server; and
 - 8 f) at least one hardware node in communication with the at least one telephone
9 application node, at least one Internet node and server.
- 1 2. The system of claim 1 further comprising at least one Internet based messaging and
2 communications management application resident on the at least one telephone
3 application node.
- 1 3. The system of claim 2 in which the at least one Internet based messaging and
2 communications management application provides voicemail functionality.
- 1 4. The system of claim 2 in which the at least one Internet based messaging and
2 communications management application provides electronic mail functionality.
- 1 5. The system of claim 2 in which the at least one Internet based messaging and
2 communications management application provides facsimile functionality.

- 1 6. The system of claim 1 further comprising at least one telephony based messaging and
2 communications management application resident on the at least one telephone
3 application node.
- 1 7. The system of claim 6 in which the at least one telephony based messaging and
2 communications management application provides voicemail functionality.
- 1 8. The system of claim 6 in which the at least one telephony based messaging and
2 communications management application provides electronic mail functionality.
- 1 9. The system of claim 6 in which the at least one telephony based messaging and
2 communications management application provides facsimile functionality.
- 1 10. The system of claim 1 in which the hardware node further comprises at least one
2 communications processing board.
- 1 11. The system of claim 10 in which the at least one communications processing board is a
2 digital network interface.
- 1 12. The system of claim 10 in which the at least one communications processing board is a
2 facsimile board.
- 1 13. The system of claim 10 in which the at least one communications processing board is a
2 text to speech processor.

1 14. The system of claim 10 in which the at least one communications processing board is a
2 conference call board.

1 15. The system of claim 10 in which the at least one communications processing board is a
2 voice recording board.

16. The system of claim 1 further comprising at least one user interface.

17. The system of claim 16 in which the interface is telephony based.

18. The system of claim 16 in which the interface is keypad based.

19. The system of claim 16 in which the interface is an Internet browser.

1 20. The system of claim 16 in which the interface provides access to stored messages and
2 real-time communications.

21. The system of claim 16 in which the interface provides people centered communications.

22. The system of claim 16 in which the interface provides cross media messaging.

1 23. The system of claim 16 in which the interface allows a user to initiate and control
2 conference call.

- 1 24. The system of claim 16 in which the interface allows a user to direct a single message to
2 multiple recipients.
- 1 25. The system of claim 16 in which the interface allows a user to create a publicly accessible
2 web page.
- 1 26. The system of claim 16 in which the interface allows a user to identify at least one
2 information source and periodically retrieve selected data from the information source.
- 1 27. The system of claim 16 further comprising an application which selects the optimal
2 communications medium for sending or receiving a message.
- 1 28. The system of claim 1 in which the Internet node further comprises:
2 a) a web manager;
3 b) an encoder in communication with the web manager; and
4 c) a second database in communication with the web manager.
- 1 29. The system of claim 28 in which the web manager periodically synchronizes the first and
2 second databases.
- 1 30. A system for managing personal communications comprising:
2 a) telephony subsystem;
3 b) an Internet subsystem in communication with the telephony subsystem; and

- 4 c) a hardware node in communication with the telephony subsystem and the Internet
5 subsystem.

31. The system of claim 30 further comprising at least one user interface.

32. The system of claim 31 in which the interface is telephony based.

33. The system of claim 31 in which the interface is keypad based.

34. The system of claim 31 in which the interface is an Internet browser.

- 1 35. The system of claim 31 in which the interface provides access to stored messages and
2 real-time communications.

36. The system of claim 31 in which the interface provides people centered communications.

37. The system of claim 31 in which the interface provides cross media messaging.

- 1 38. The system of claim 31 in which the interface allows a user to initiate and control
2 conference call.

- 1 39. The system of claim 31 in which the interface allows a user to direct a single message to
2 multiple recipients.

- 1 40. The system of claim 31 in which the interface allows a user to create a publicly accessible
2 web page.
- 1 41. The system of claim 31 in which the interface allows a user to identify at least one
2 information source and periodically retrieve selected data from the information source.
- 1 42. The system of claim 31 further comprising an application which selects the optimal
2 communications medium for sending or receiving a message.
- 1 43. A system for accessing, creating and managing communications and messages
2 comprising:
3 a) a system client;
4 b) a computer telephony interface library in communication with the client; and
5 c) a computer telephony interface server in communication with the library.
44. The system of claim 43 in which the system client provides at least one service.
45. The system of claim 44 in which the service is facsimile message management.
- 1 46. The system of claim 44 in which the service is automated message delivery to a
2 predetermined recipient.
47. The system of claim 44 in which the service is electronic mail management

48. The system of claim 44 in which the service is electronic mail text to speech conversion.

49. The system of claim 44 in which the service is an automated response to electronic mail.

50. The system of claim 44 in which the service is call flow mapping.

51. The system of claim 43 further comprising at least one user interface.

52. The system of claim 51 in which the interface is telephony based.

53. The system of claim 51 in which the interface is keypad based.

54. The system of claim 51 in which the interface is an Internet browser.

1 55. The system of claim 51 in which the interface provides access to stored messages and
2 real-time communications.

56. The system of claim 51 in which the interface provides people centered communications.

57. The system of claim 51 in which the interface provides cross media messaging.

1 58. The system of claim 51 in which the interface allows a user to initiate and control
2 conference call.

- 1 59. The system of claim 51 in which the interface allows a user to direct a single message to
2 multiple recipients.
- 1 60. The system of claim 51 in which the interface allows a user to create a publicly accessible
2 web page.
- 1 61. The system of claim 51 in which the interface allows a user to identify at least one
2 information source and periodically retrieve selected data from the information source.
- 1 62. The system of claim 51 further comprising an application which selects the optimal
2 communications medium for sending or receiving a message.
- 1 63. A method for permitting a user to manage personal communications comprising the steps
2 of:
3 a) providing a telephony subsystem;
4 b) providing an Internet subsystem in communication with the telephony subsystem;
5 c) providing a hardware node in communication with the telephony subsystem and
6 the Internet subsystem; and
7 d) providing a user interface.
- 1 64. The system of claim 63 further comprising the step of providing access to stored
2 messages and real-time communications.

- 1 65. The system of claim 63 further comprising the step of providing people centered
2 communications.
66. The system of claim 63 further comprising the step of providing cross media messaging.
- 1 67. The system of claim 63 further comprising the step of allowing a user to initiate and
2 control conference call.
- 1 68. The system of claim 63 further comprising the step of allowing a user to direct a single
2 message to multiple recipients.
- 1 69. The system of claim 63 further comprising the step of allowing a user to create a publicly
2 accessible web page.
- 1 70. The system of claim 63 further comprising the step of allowing a user to identify at least
2 one information source and periodically retrieve selected data from the information
3 source.
- 4 71. The system of claim 63 further comprising the step of automatically selecting the optimal
5 communications medium for sending or receiving a message.
- 1 72. A system for managing personal communications comprising:
2 a) telephony subsystem;

- 3 b) an Internet subsystem in communication with the telephony subsystem;
- 4 c) a hardware node in communication with the telephony subsystem and the Internet
- 5 subsystem;
- 6 d) at least one keypad based interface in communication with the telephony
- 7 subsystem;
- 8 e) at least one web browser interface in communication with the Internet subsystem;
- 9 and
- 10 f) a billing information system in communication with the telephony and Internet
- 11 subsystems and with a payment source.

73. The system of claim 72 in which the payment source is a credit card account.

74. The system of claim 72 in which the payment source is a bank account.

75. The system of claim 72 in which the keypad interface is a telephone.

1 76. The system of claim 72 in which the interfaces provides access to stored messages and

2 real-time communications.

77. The system of claim 72 in which the interfaces provide people centered communications.

78. The system of claim 72 in which the interfaces provide cross media messaging.

- 1 79. The system of claim 72 in which the interfaces allows a user to initiate and control
2 conference call.
- 1 80. The system of claim 72 in which the interfaces allows a user to direct a single message to
2 multiple recipients.
- 1 81. The system of claim 72 in which the interfaces allow a user to create a publicly accessible
2 web page.
- 1 82. The system of claim 72 in which the interfaces allow a user to identify at least one
2 information source and periodically retrieve selected data from the information source.
- 1 83. The system of claim 72 further comprising an application which selects the optimal
2 communications medium for sending or receiving a message.

Phase On --NMS Migration and PC3 Integration

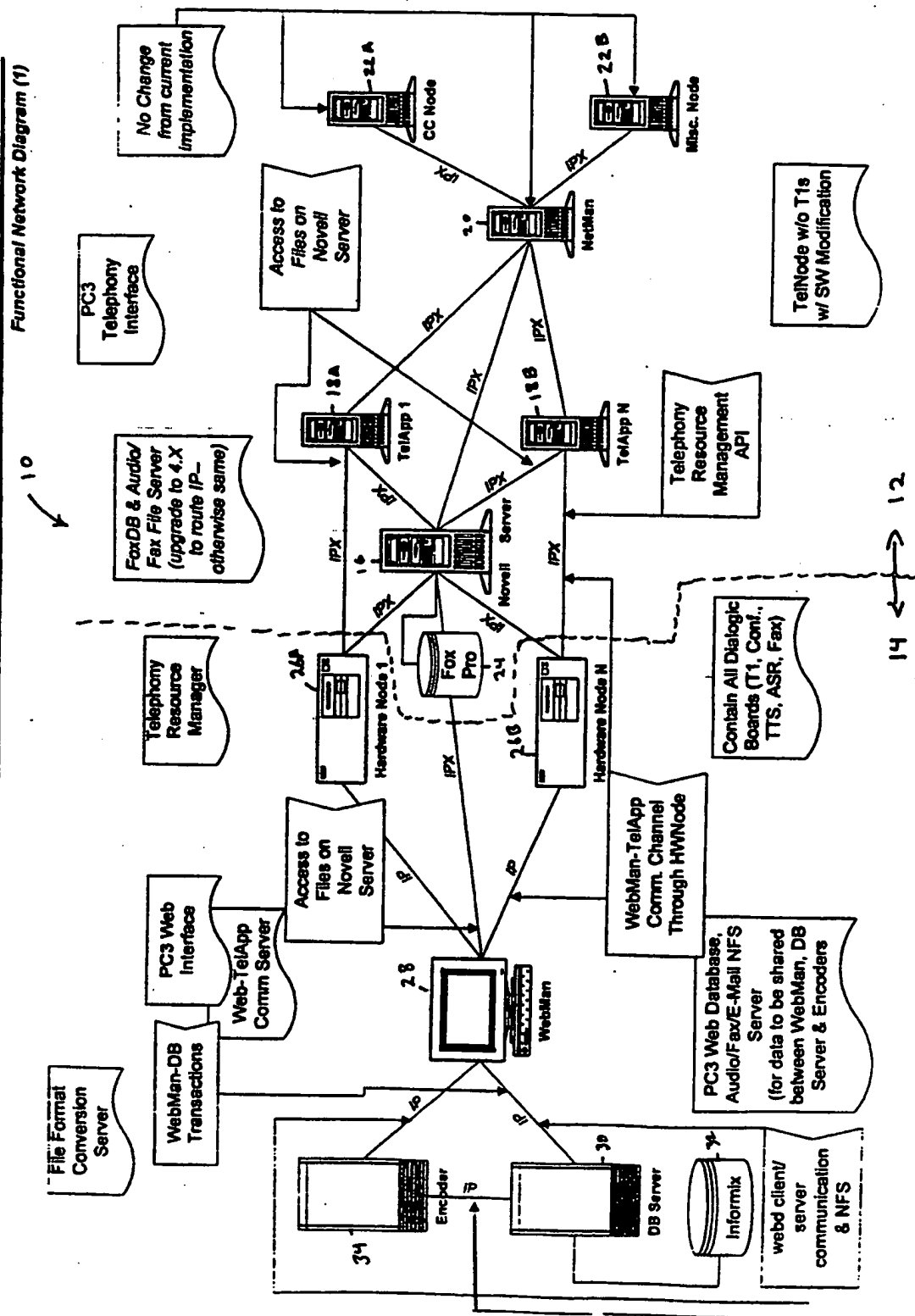


Fig. 1

Phase One--Unaffected NMS Segment

Functional Network Diagram (2)

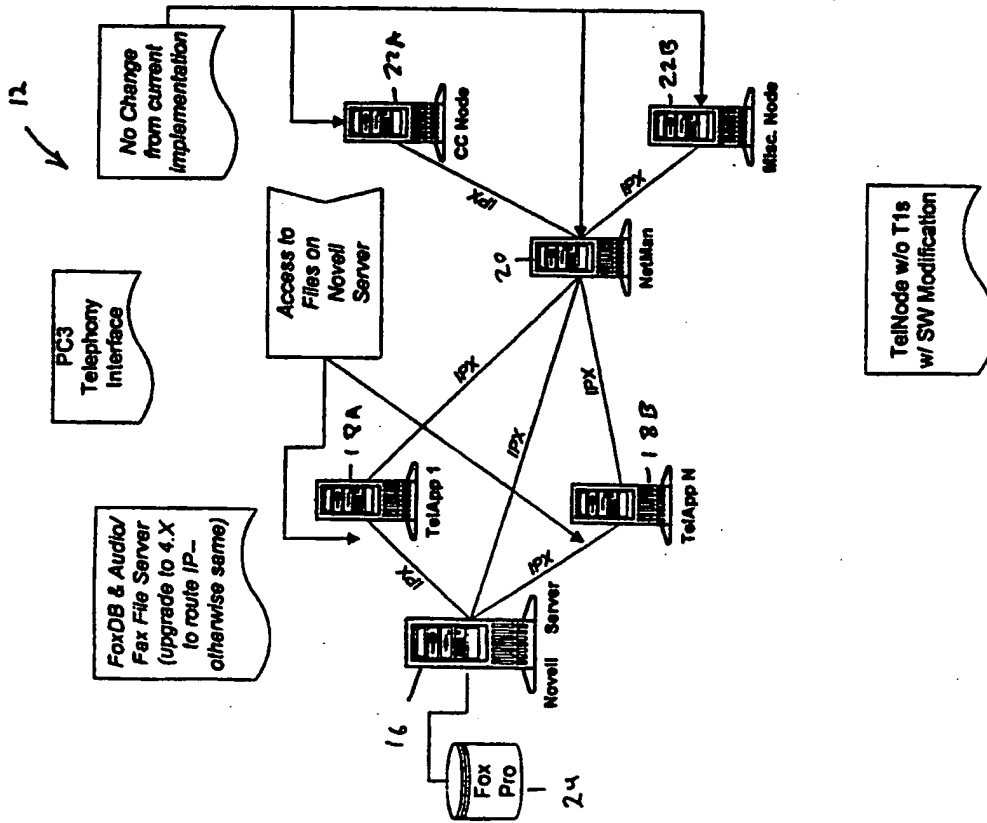


Fig. 2

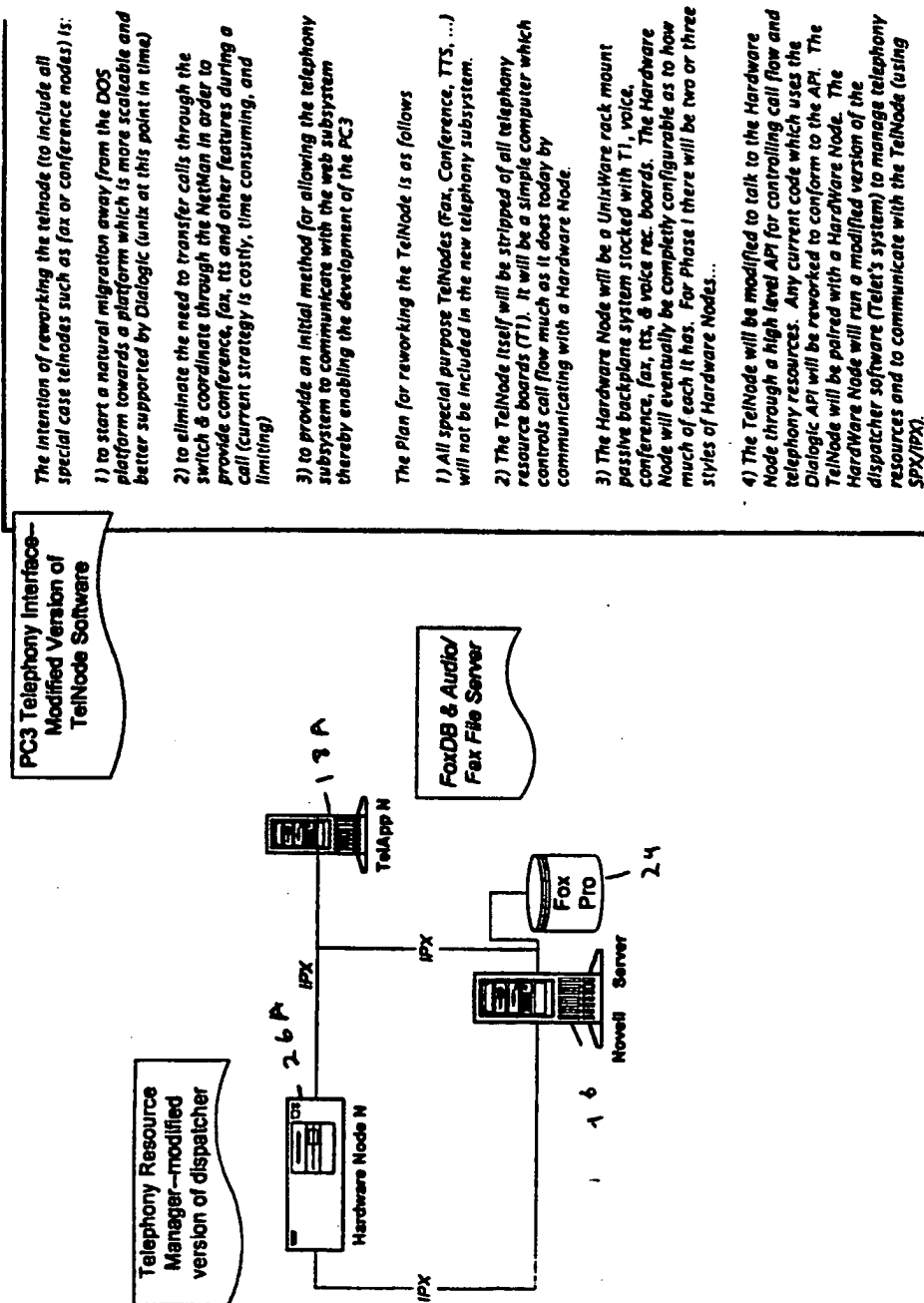
This Section of the NMS is relatively untouched by Phase 1 of the migration. The NetMan, Novell File Server/Fox Pro Database, Credit Card/Billing Nodes, and TelNodes (now TelApps) interact with each other just as they always have.

Special Purpose TelNodes (FaxNode, TTS Node, Conference Node) are removed from the system, as this role will be distributed between the Hardware Node and the TelApp.

The TelApp is a TelNode stripped of all Digital Network Interface (T1) boards. A TelApp is dependent upon its Hardware Node which contains all necessary boards (T1, fax, TTS, conference, etc.) and which manages those resources.

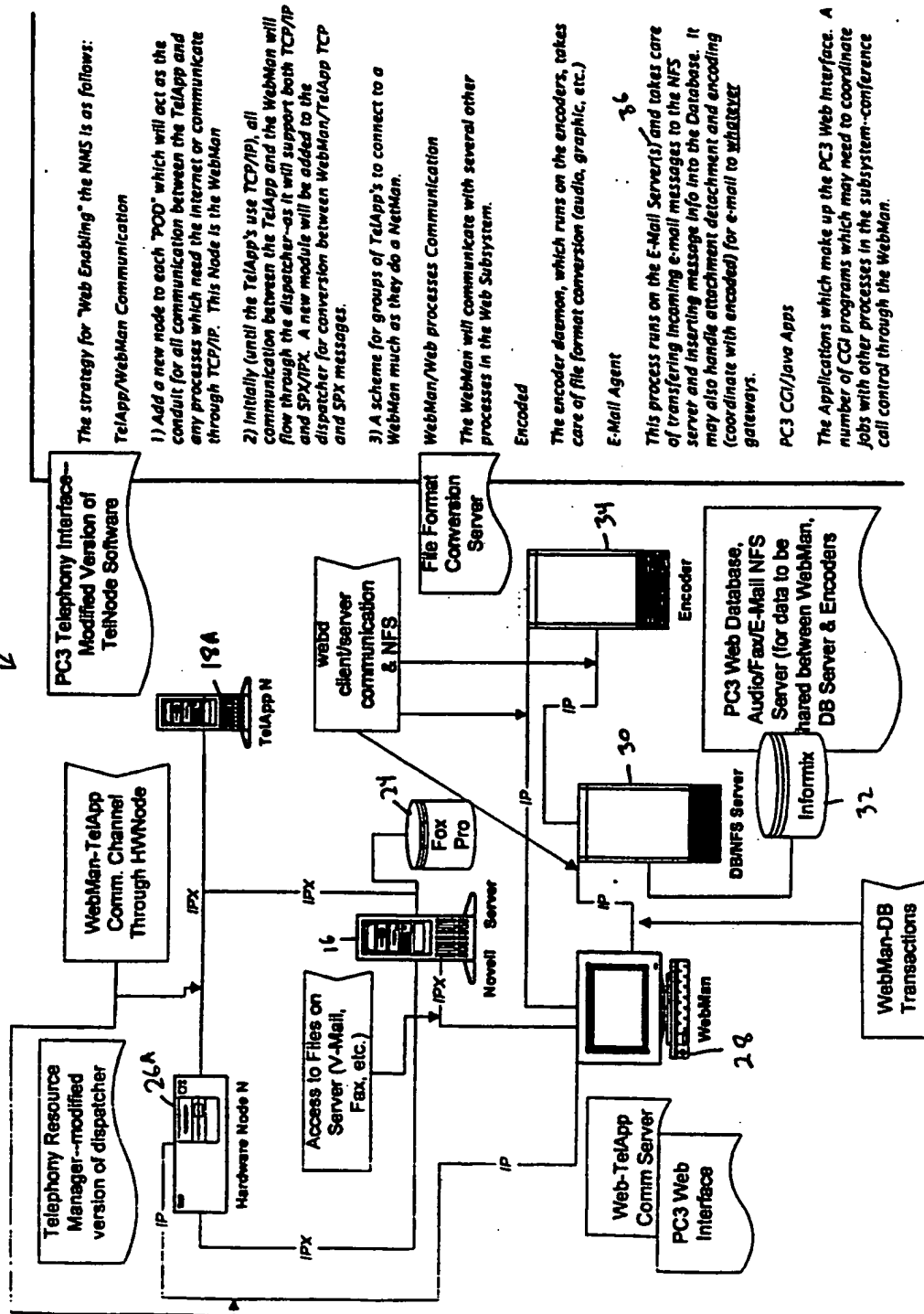
Phase One--TelApp & Hardware Node (TelN d Split)

Functional Network Diagram (3)



Phase One--Integration of NMS and the Internet

Functional Network Diagram (4)



Phas One--NMS File System Organization

Software Diagram (1)

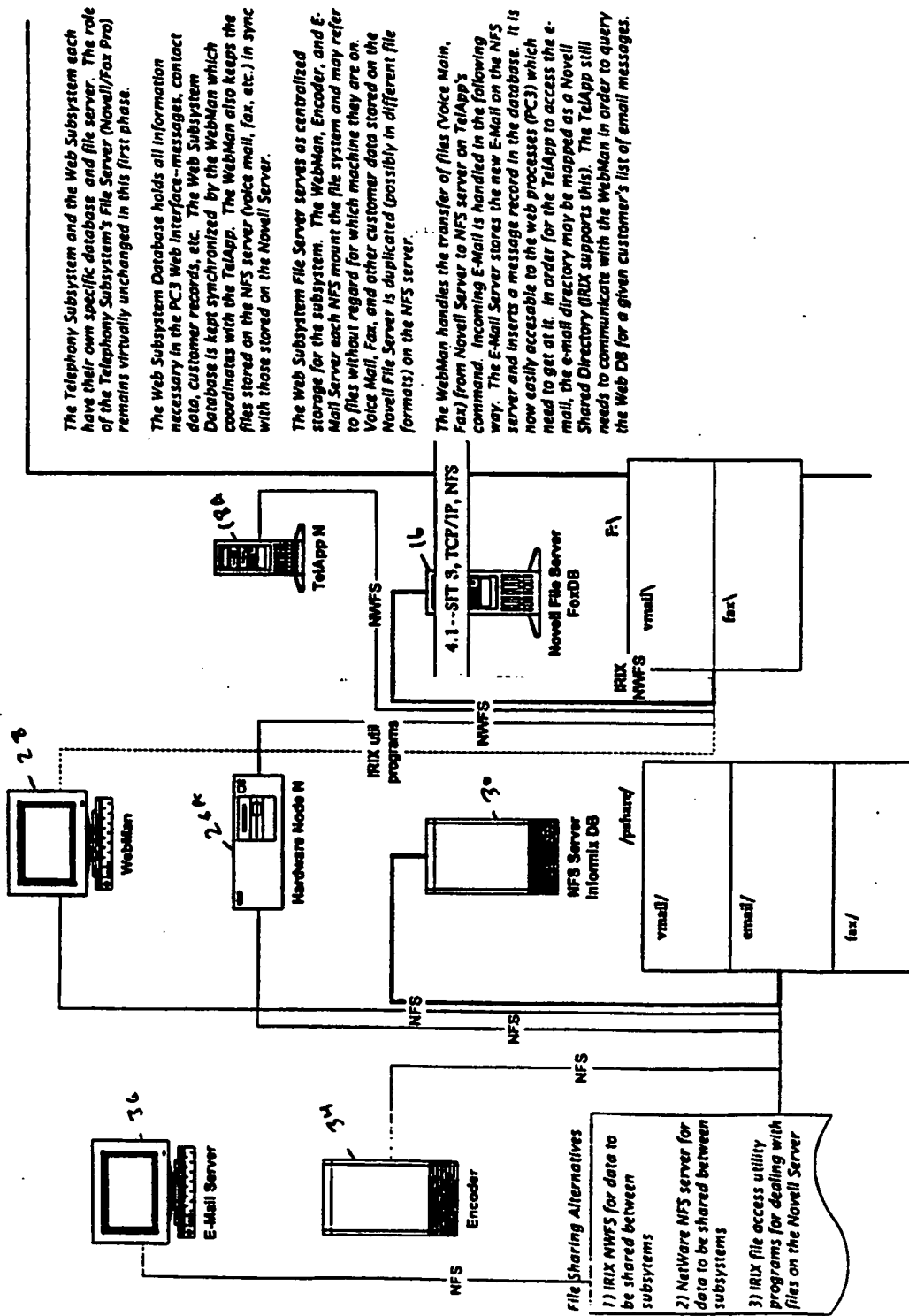


Fig 5

Phas One--Subsystem IPC

Software Diagram (2)

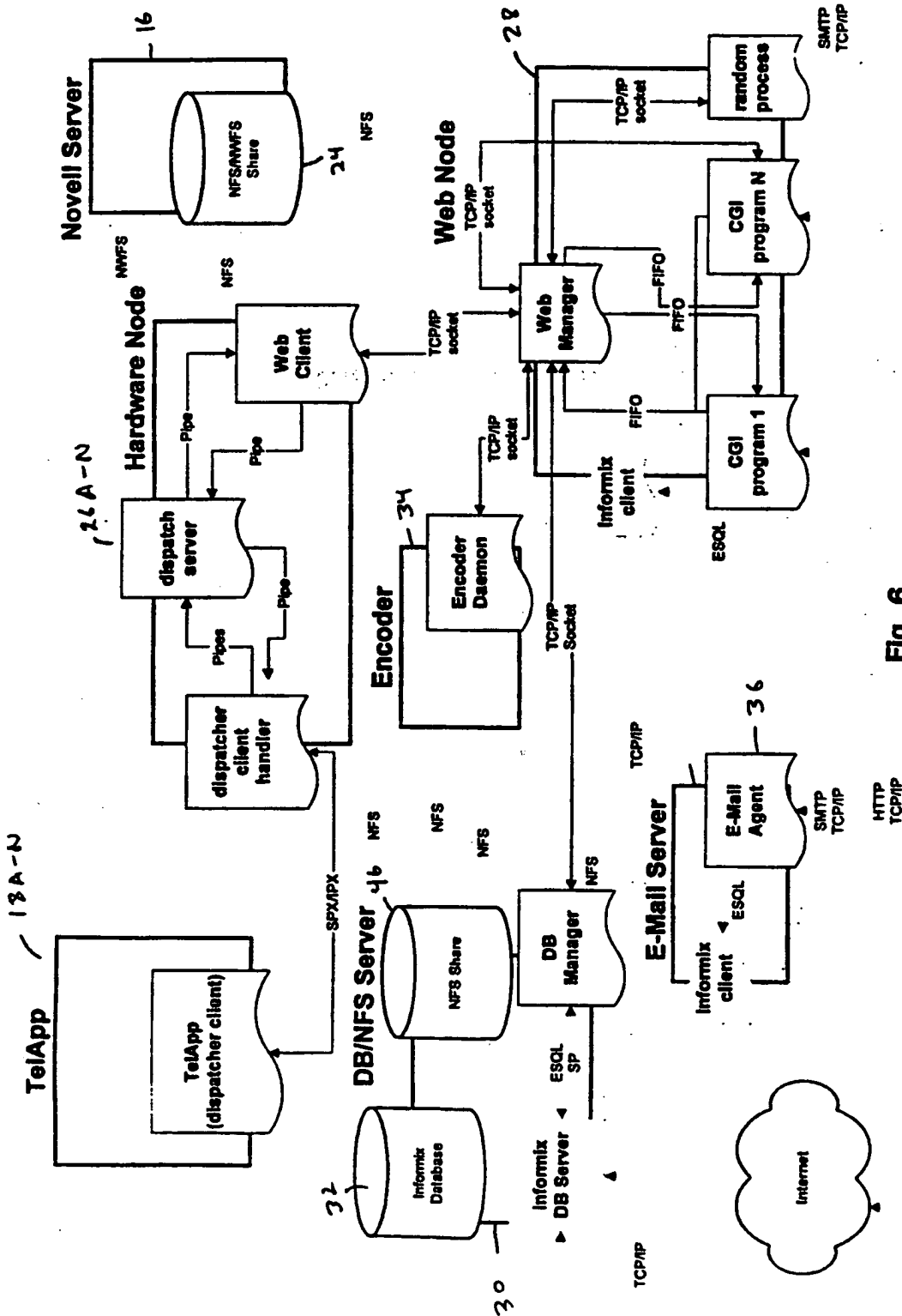
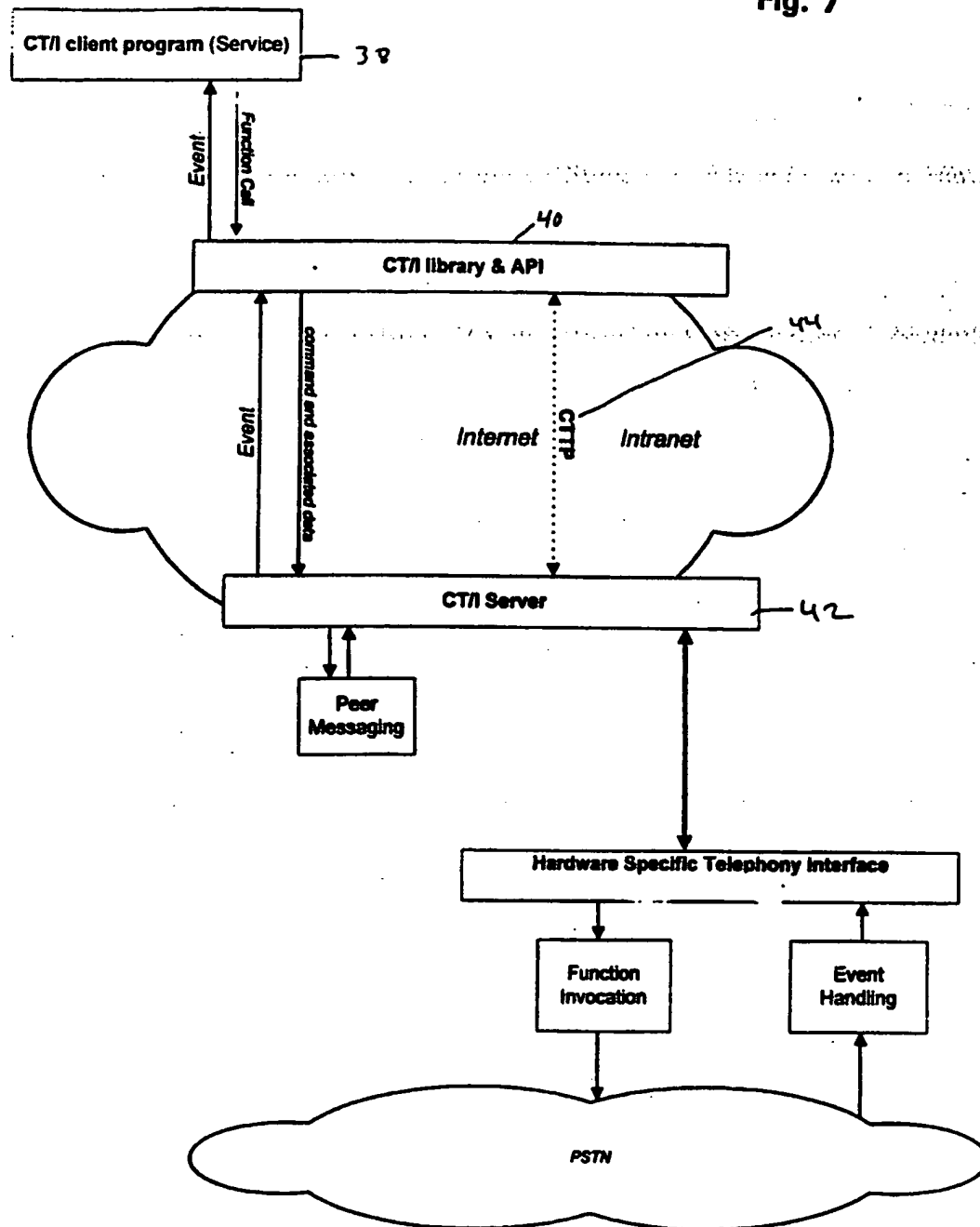
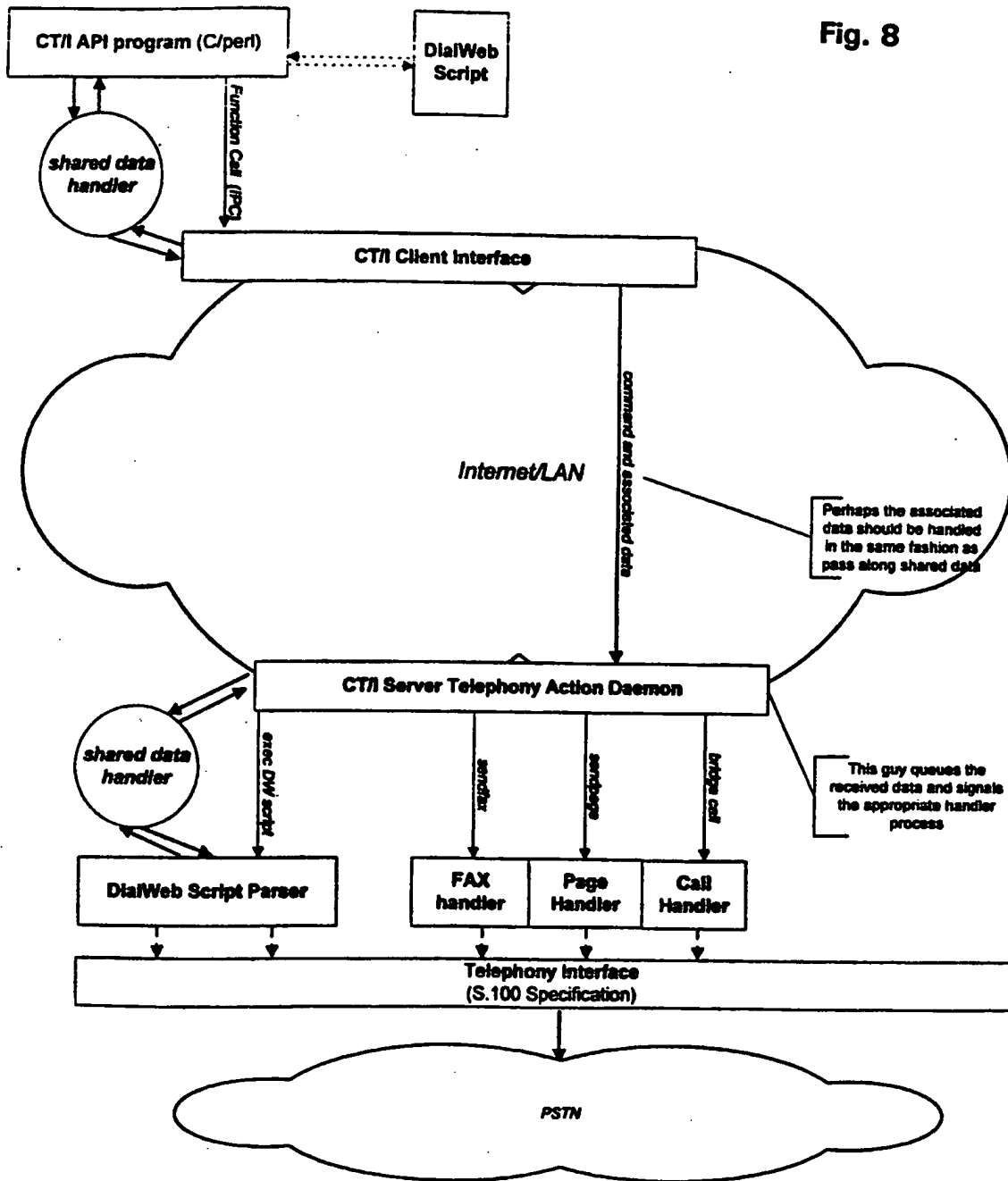


Fig. 6

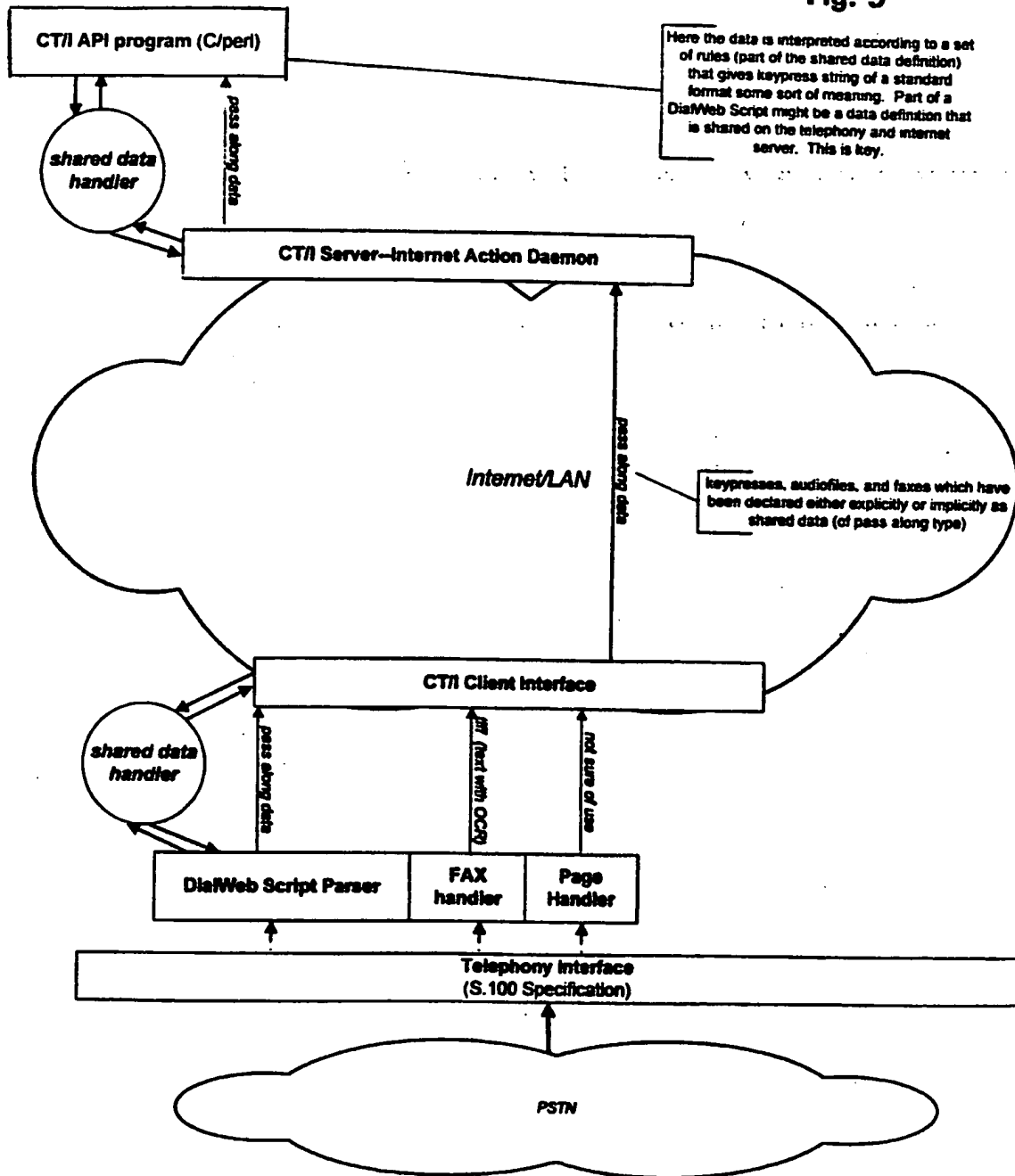
CT/I Client/Server Diagram**Fig. 7**

Web process initiates a telephone action

Fig. 8

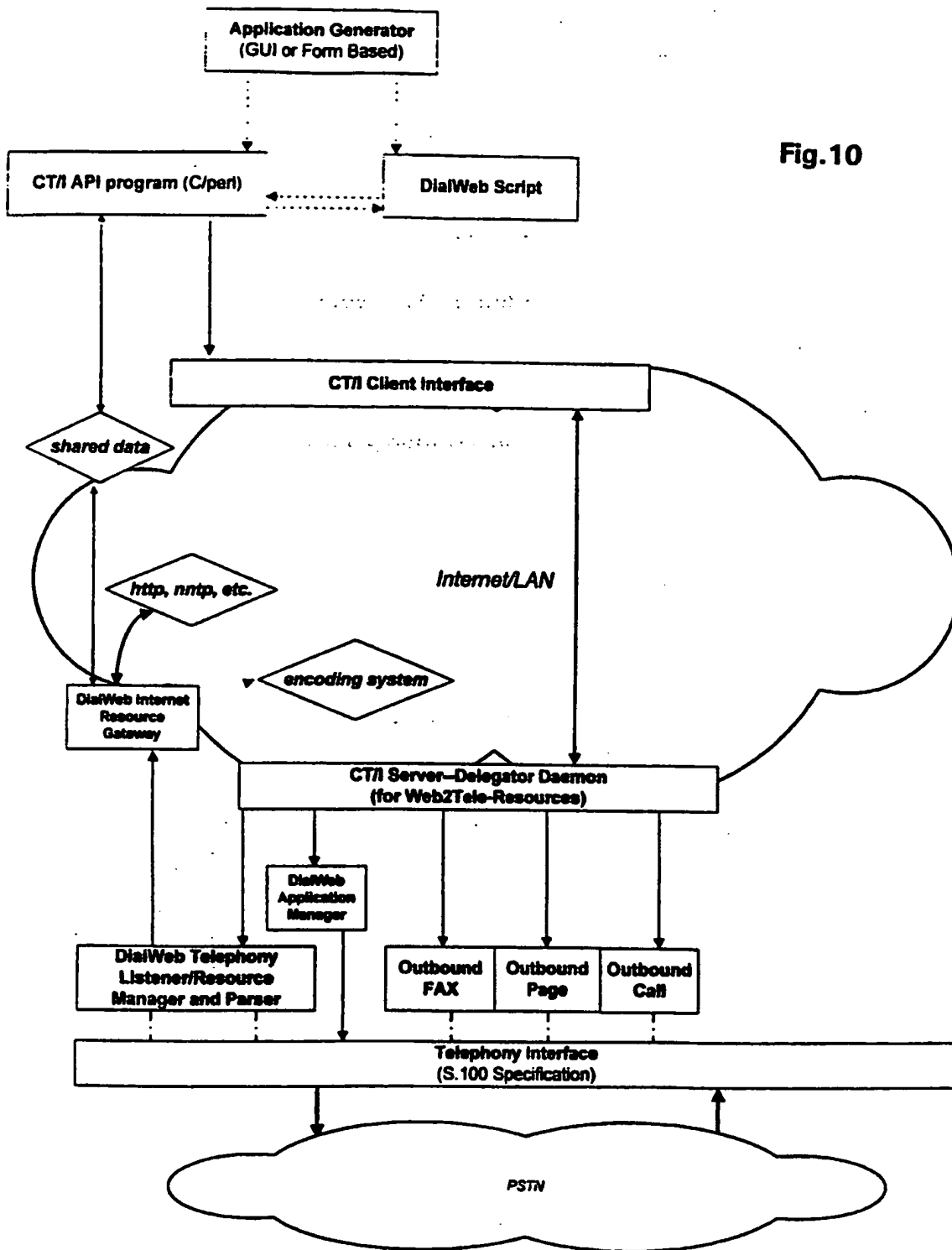
9/39

Telephone process initiates an internet action

Fig. 9

10/39

Fig. 10



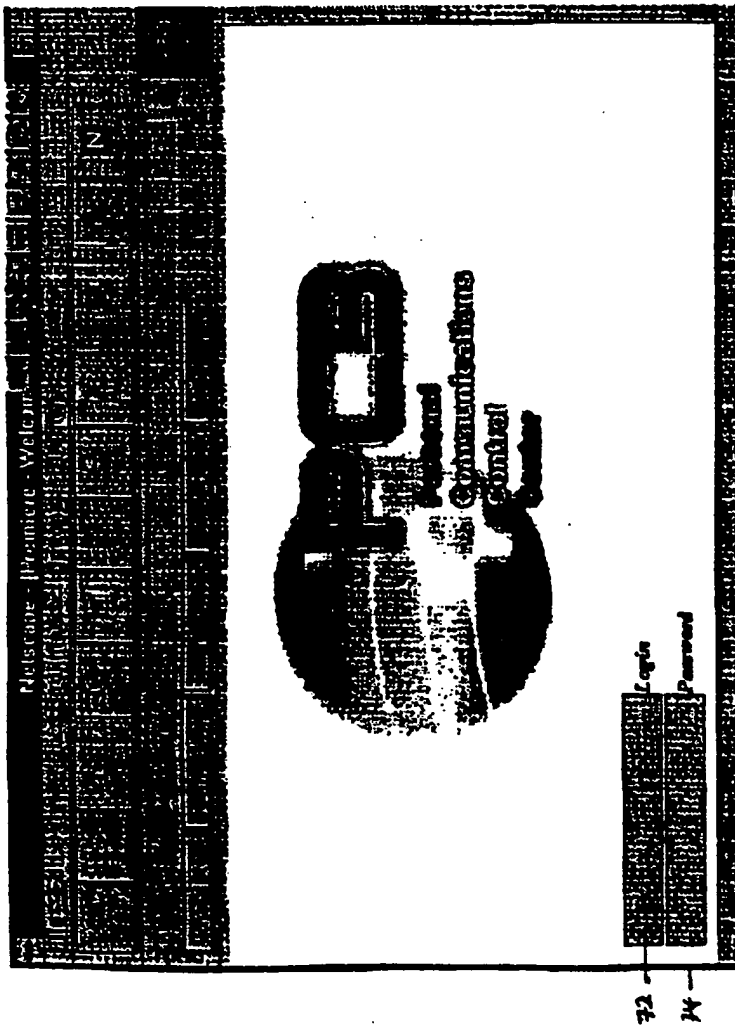


Fig. 11

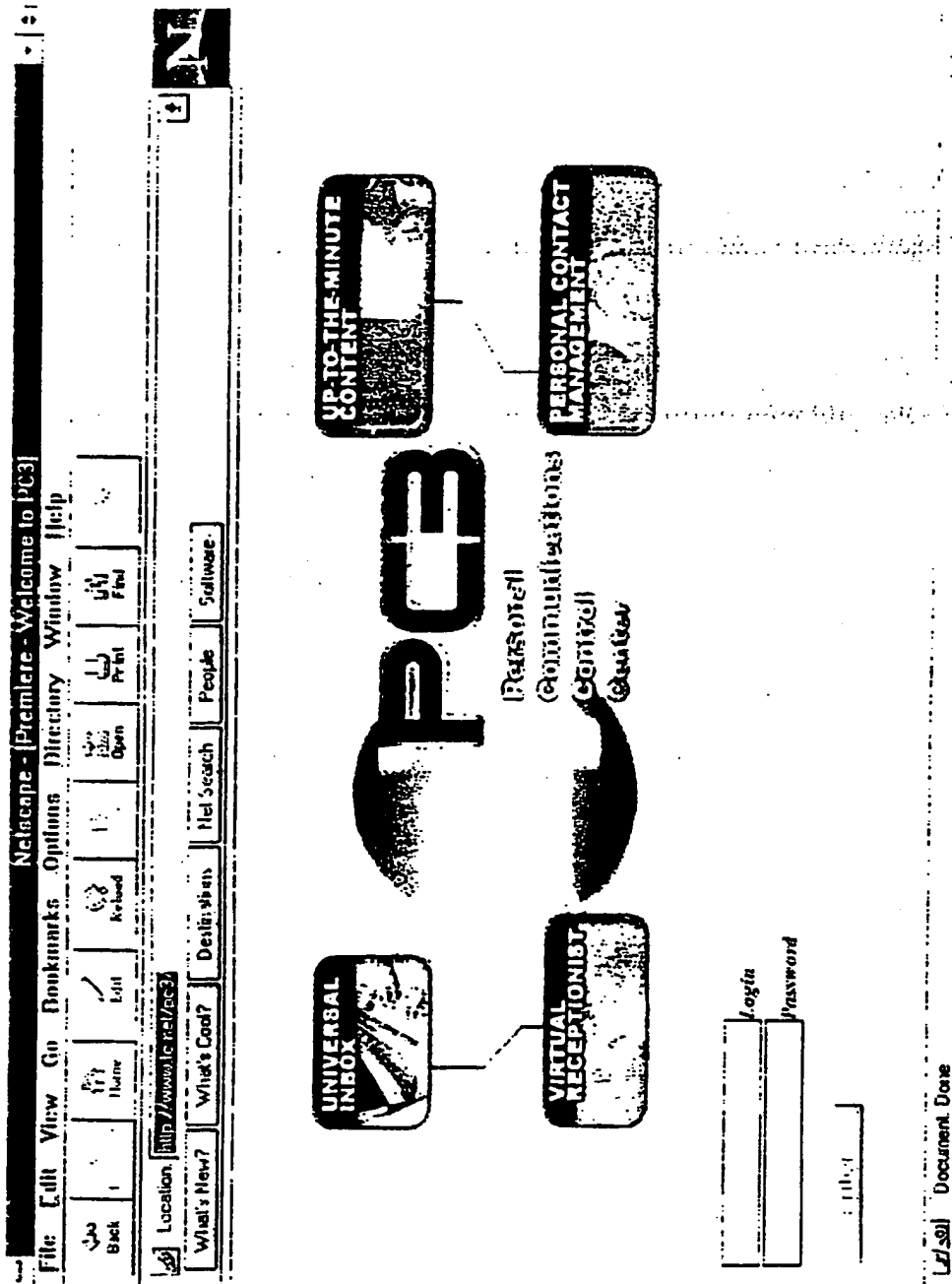


Fig. 11A

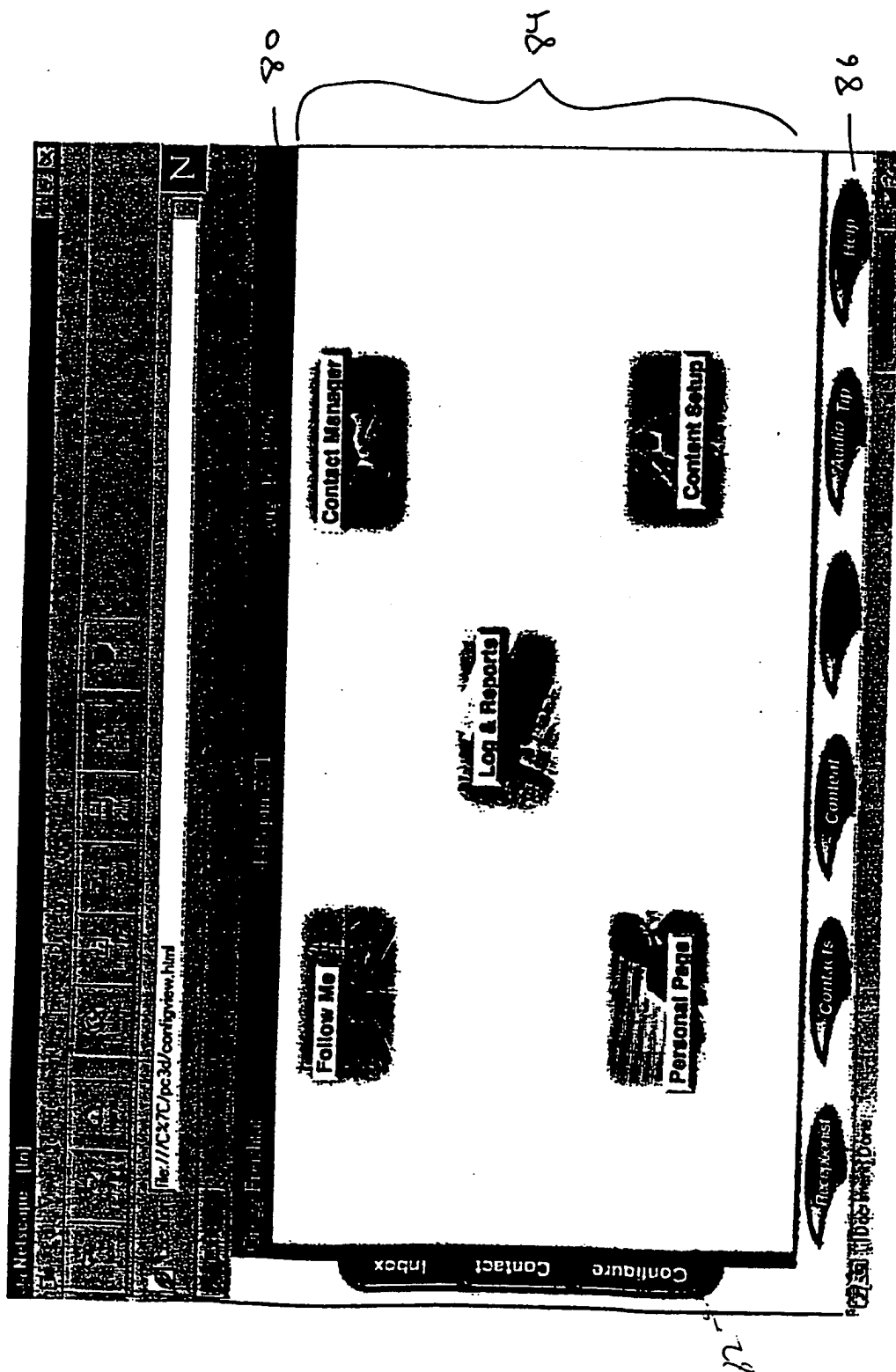


Fig. 12

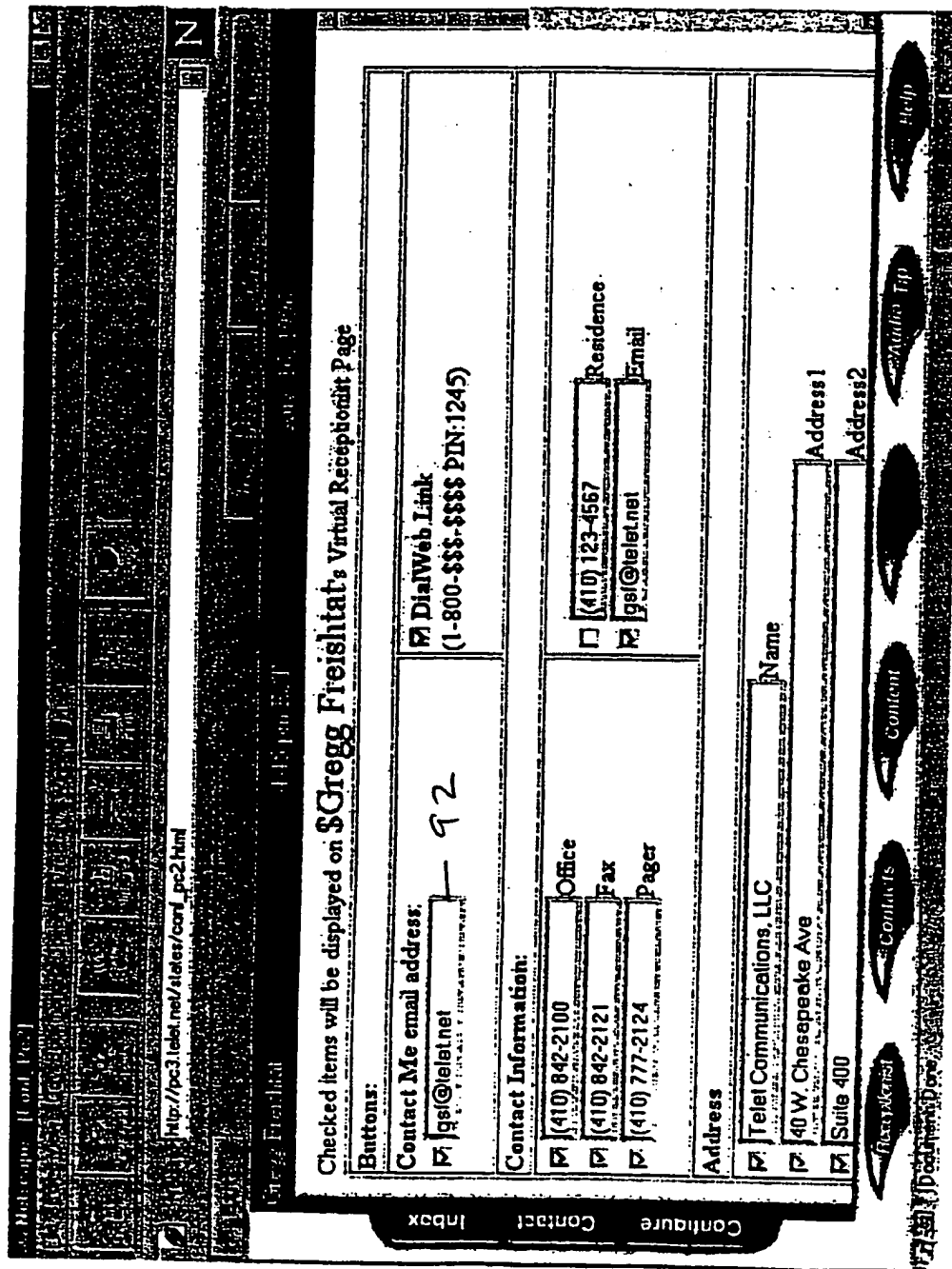


Fig. 13

Netcap: [In]

file:///C:/C:/pc3d/followmeo.html

Aug 16, 1996

4:45 pm EDT

Greg Fieldat

Normal Location

Default Contact Information:

Inbox

(410) 842-2100 Phone

(410) 842-2121 Fax

(410) 777-2124 Pager

Telnet Communications, LLC Name

40 W. Chesapeake Ave Address1

Suite 400 Address2

Towson City MD State 21204 Zipcode

Scheduled Information:

Configure

Contacts

Content

Audio Tip

Help

Fig. 13A

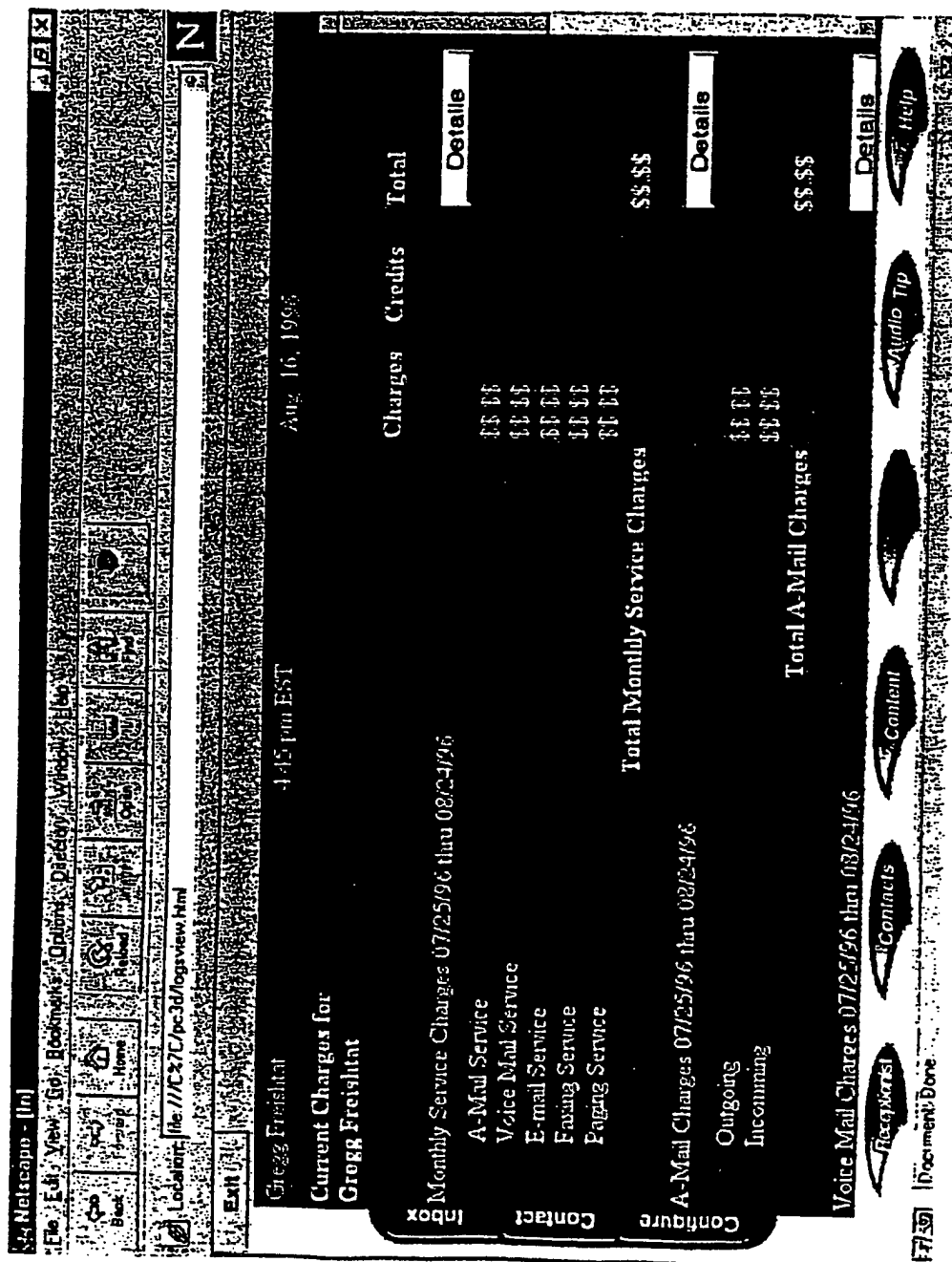


Fig. 13B

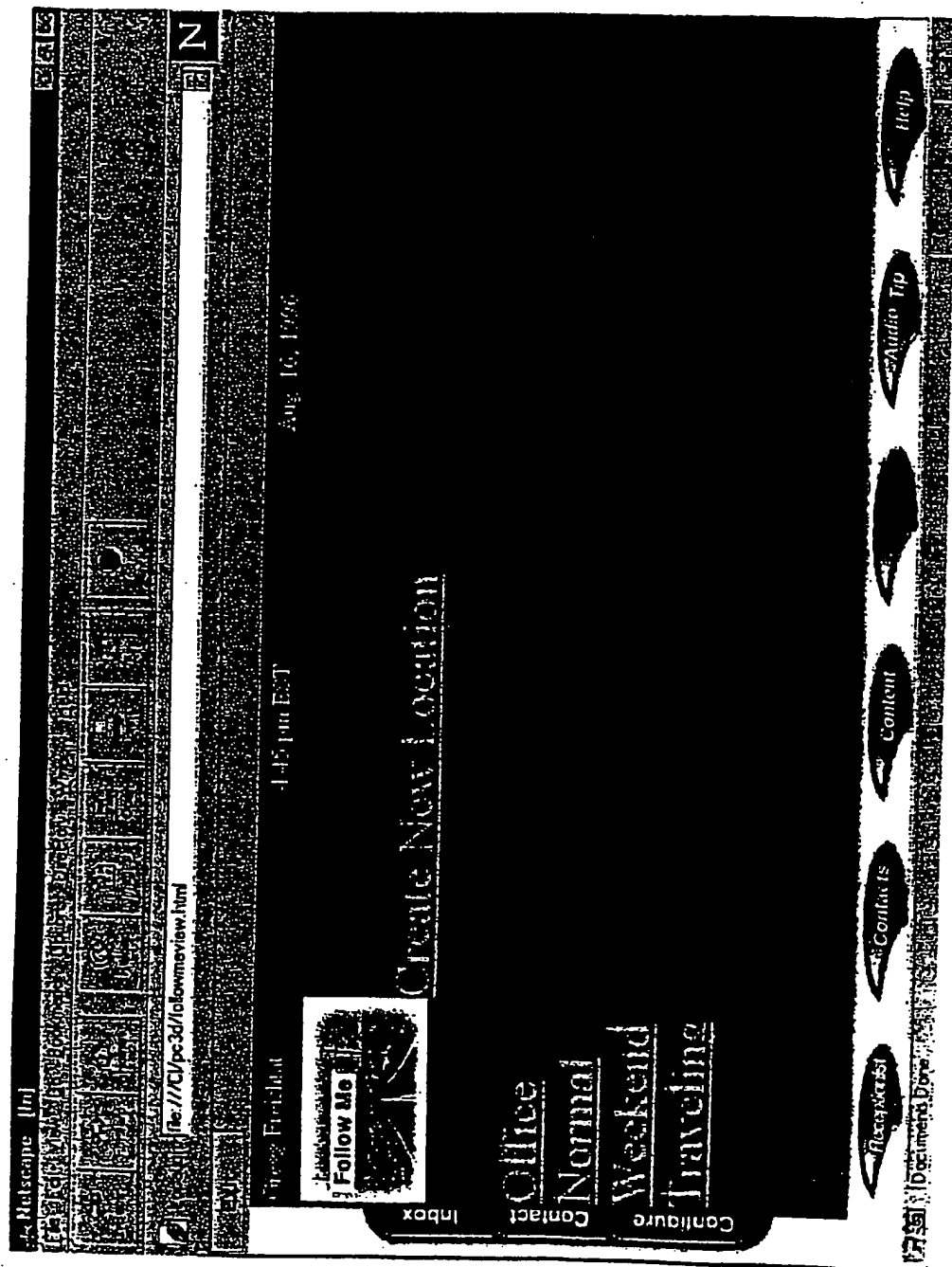


Fig. 13C

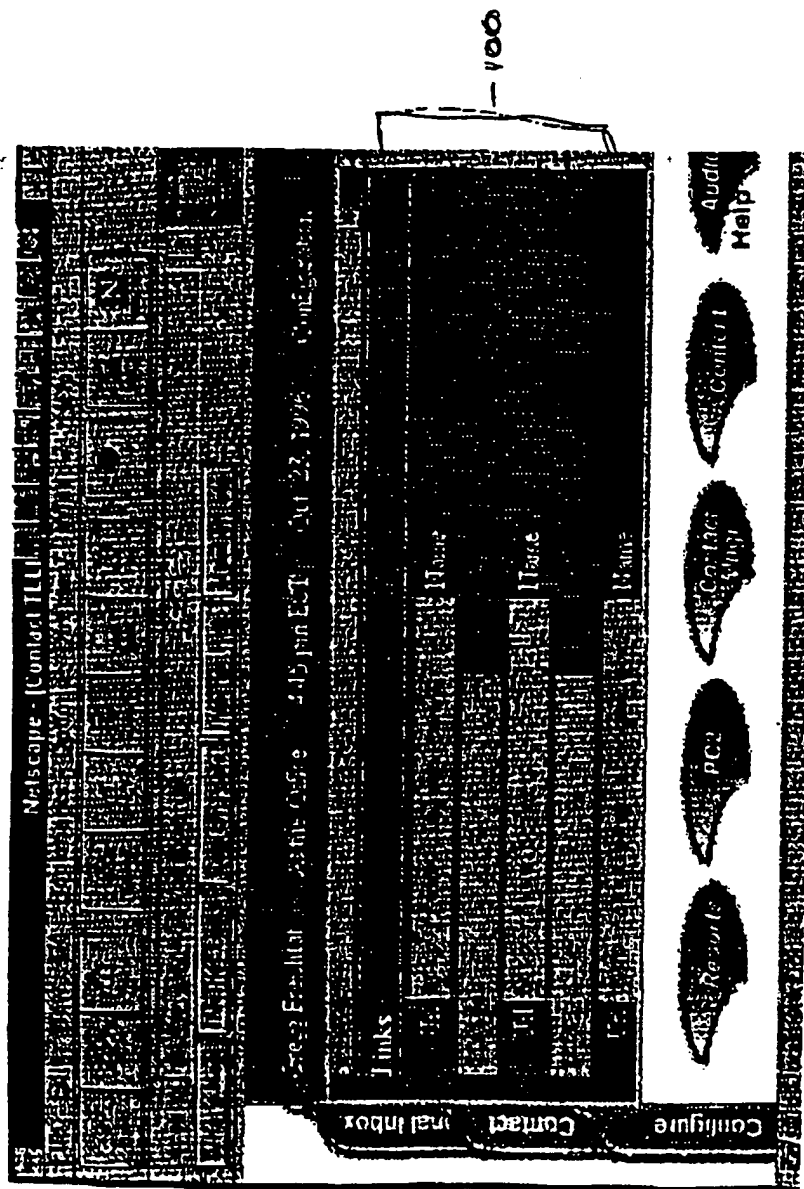


Fig. 14

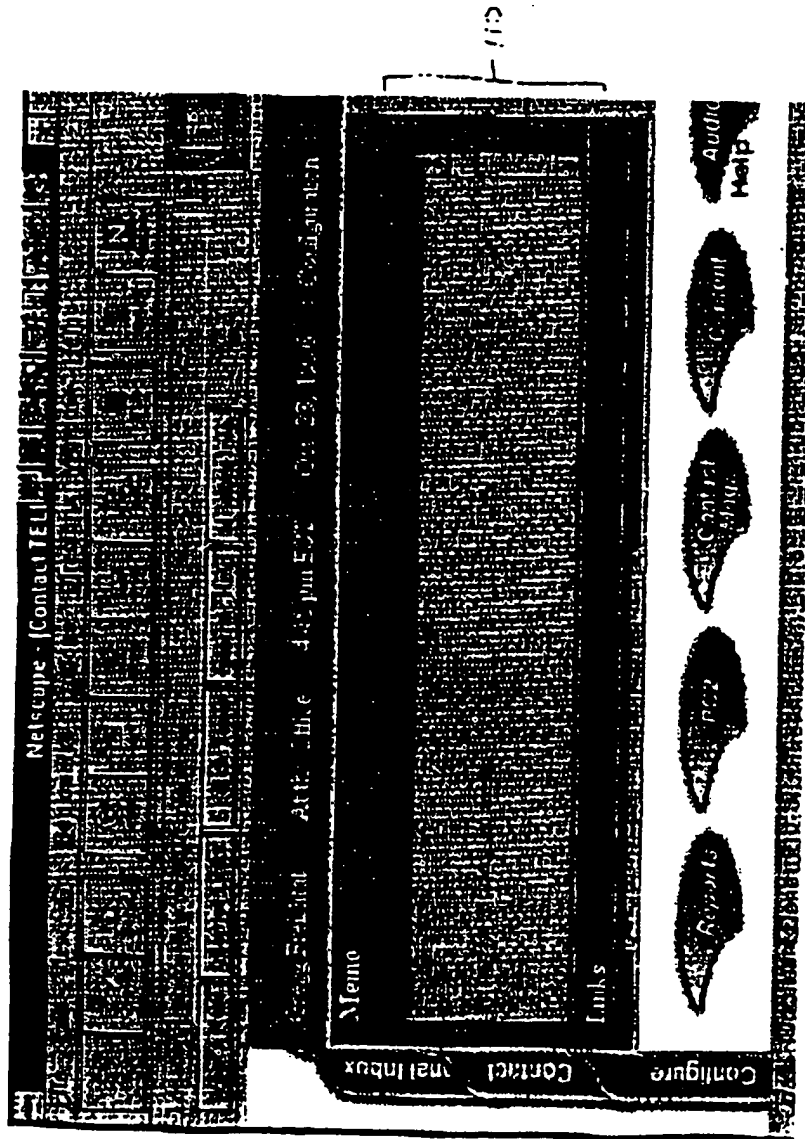


Fig. 15

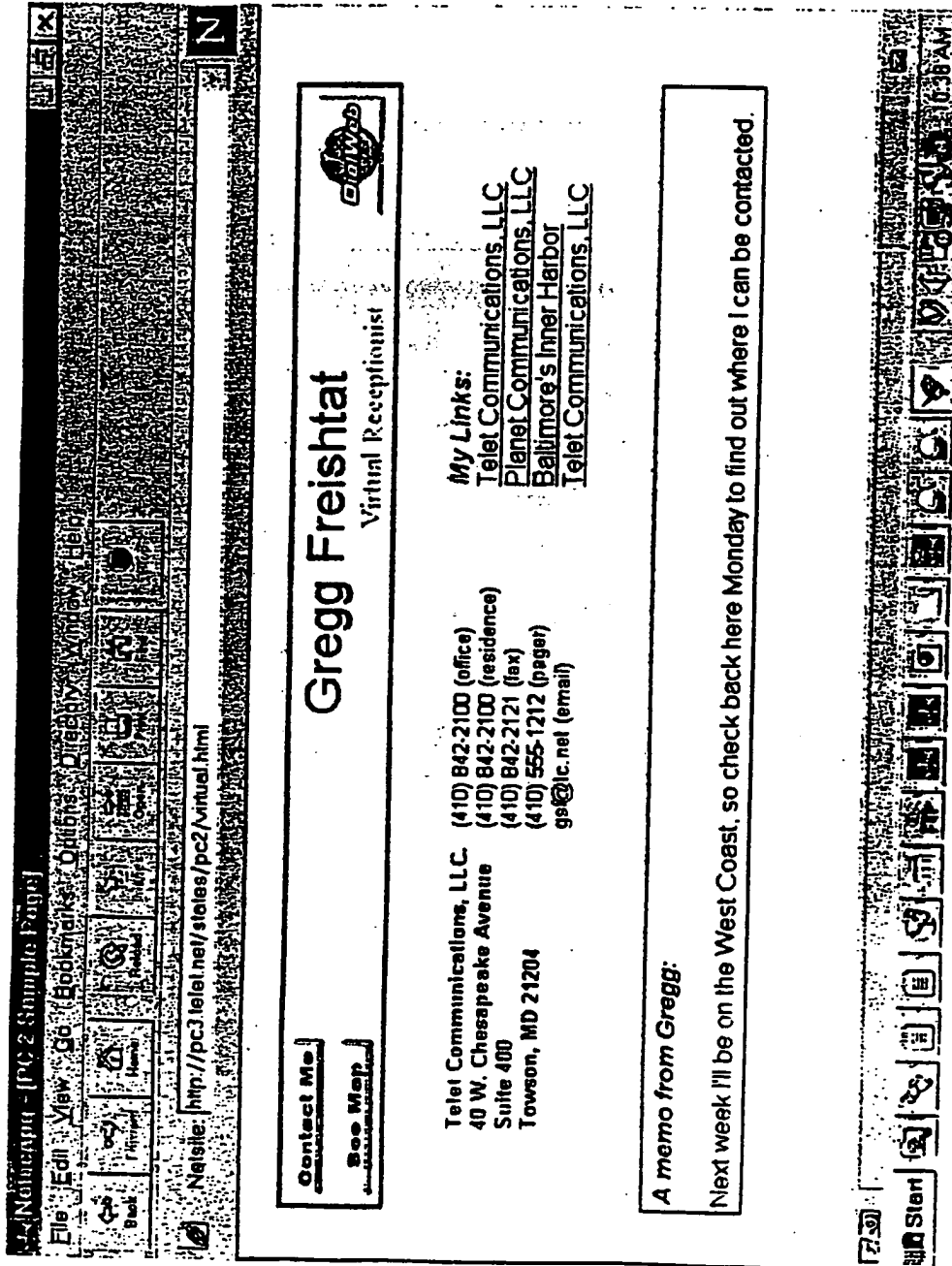


Fig. 16

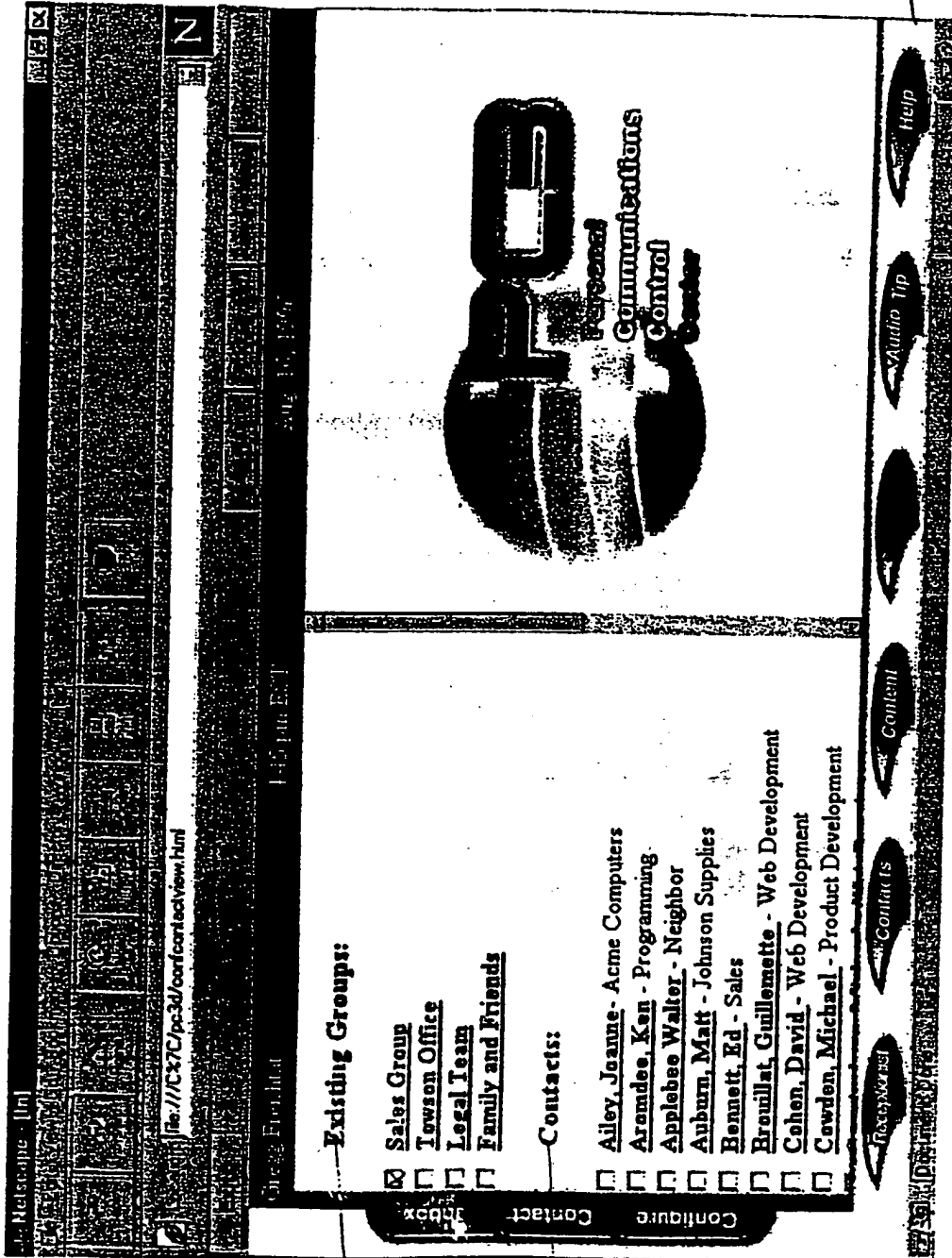


Fig. 17

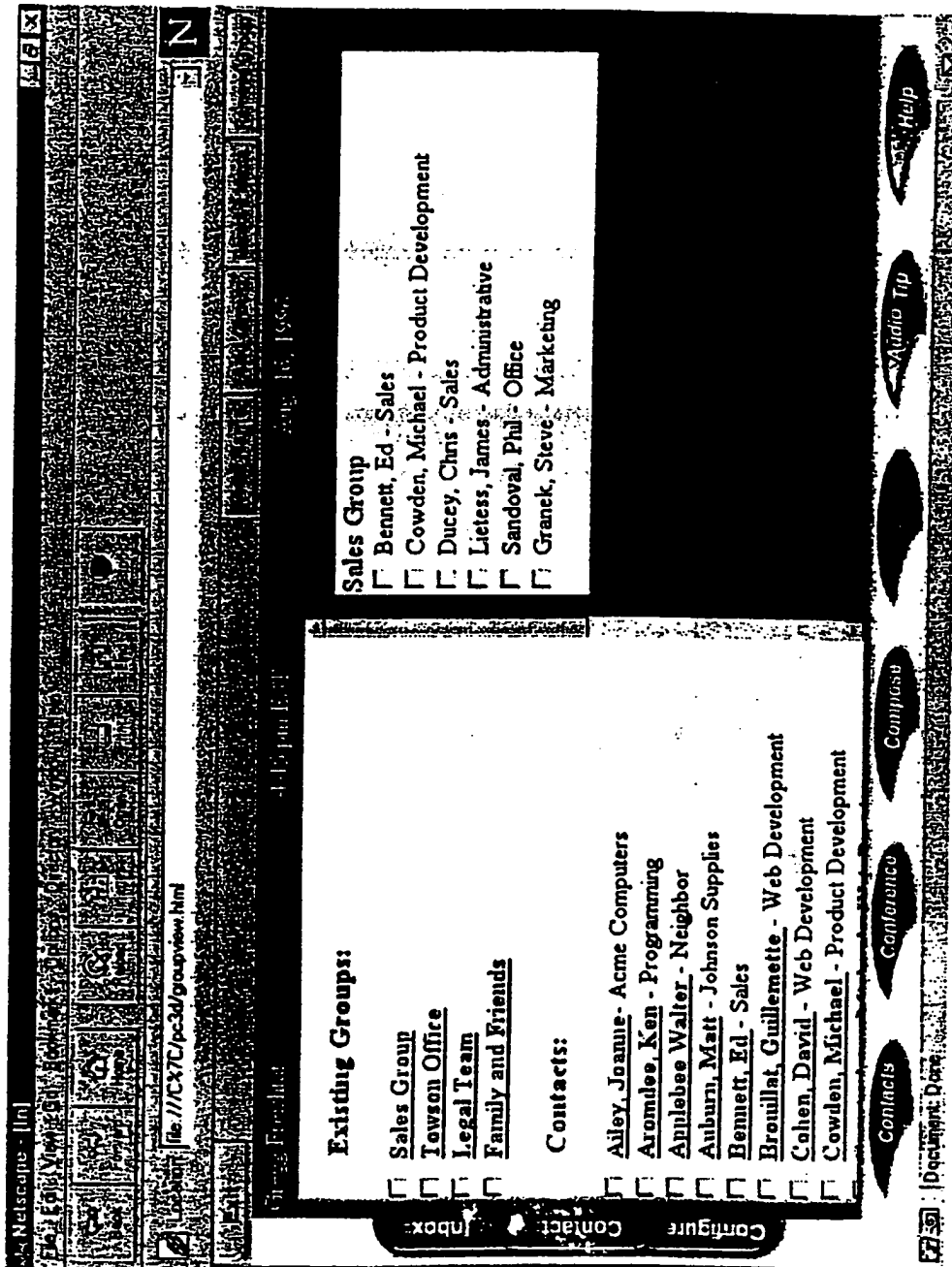


Fig. 17A

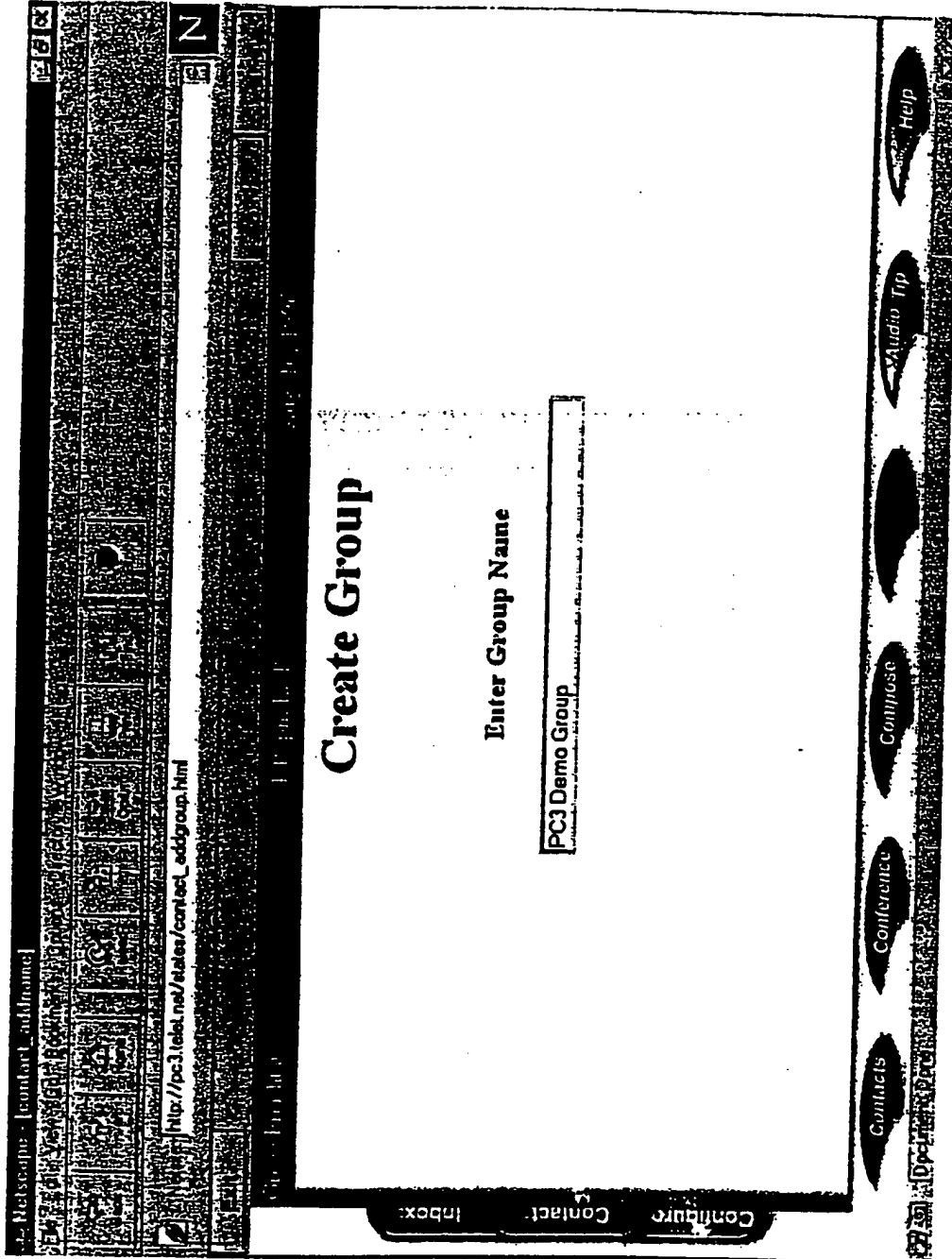


Fig. 17B

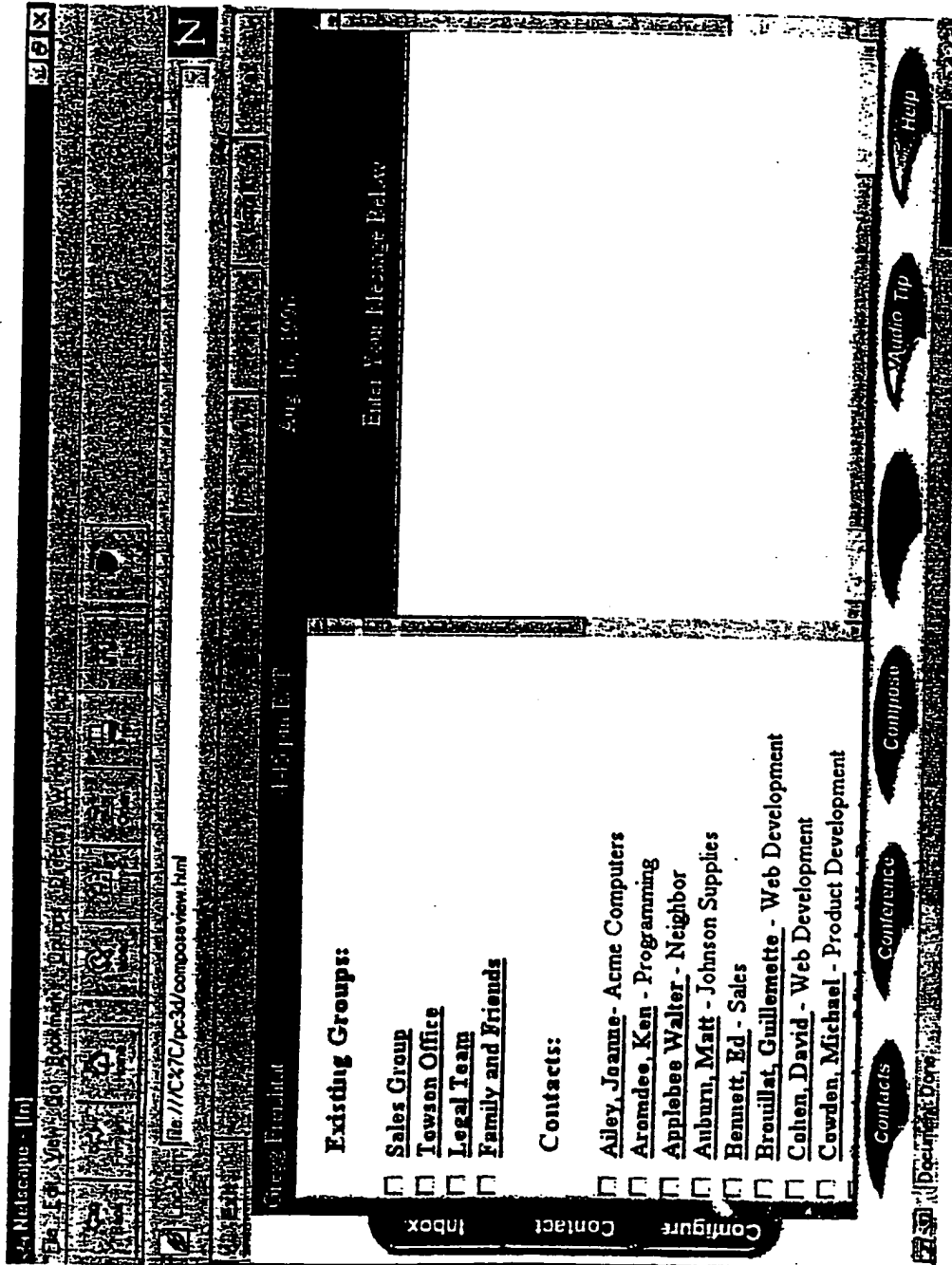


Fig. 17C

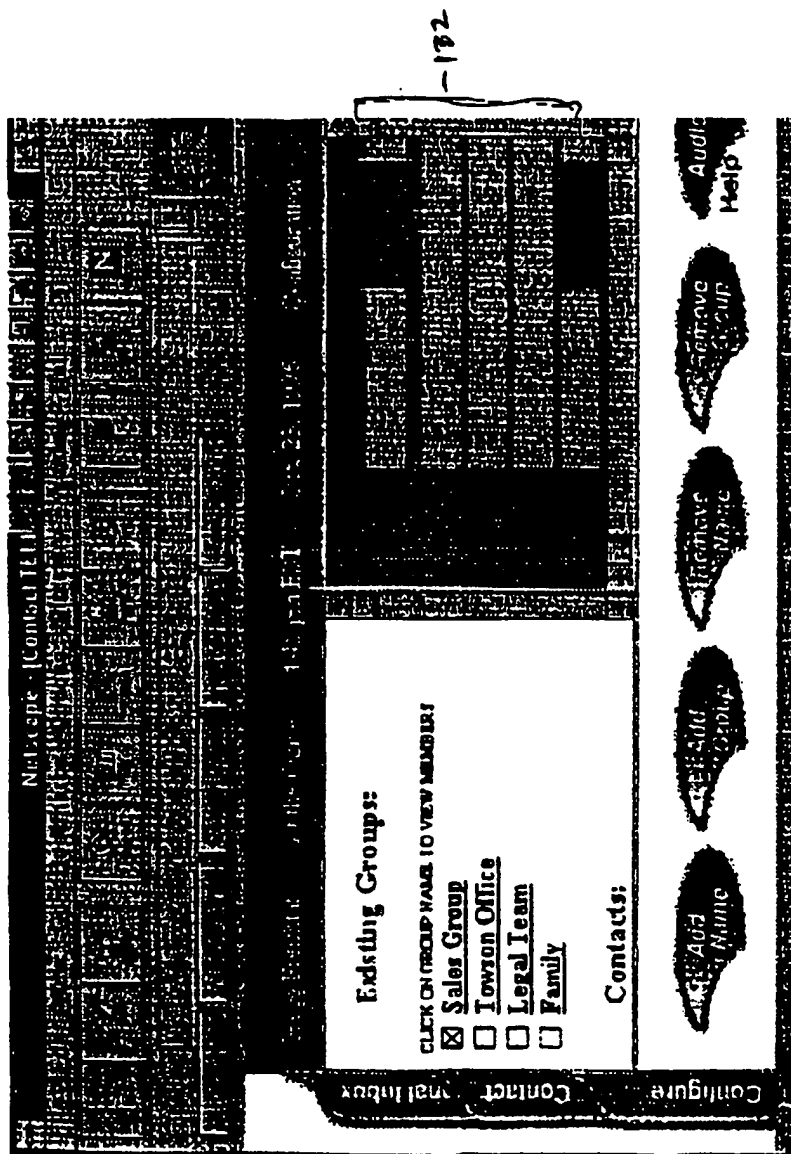


Fig. 18

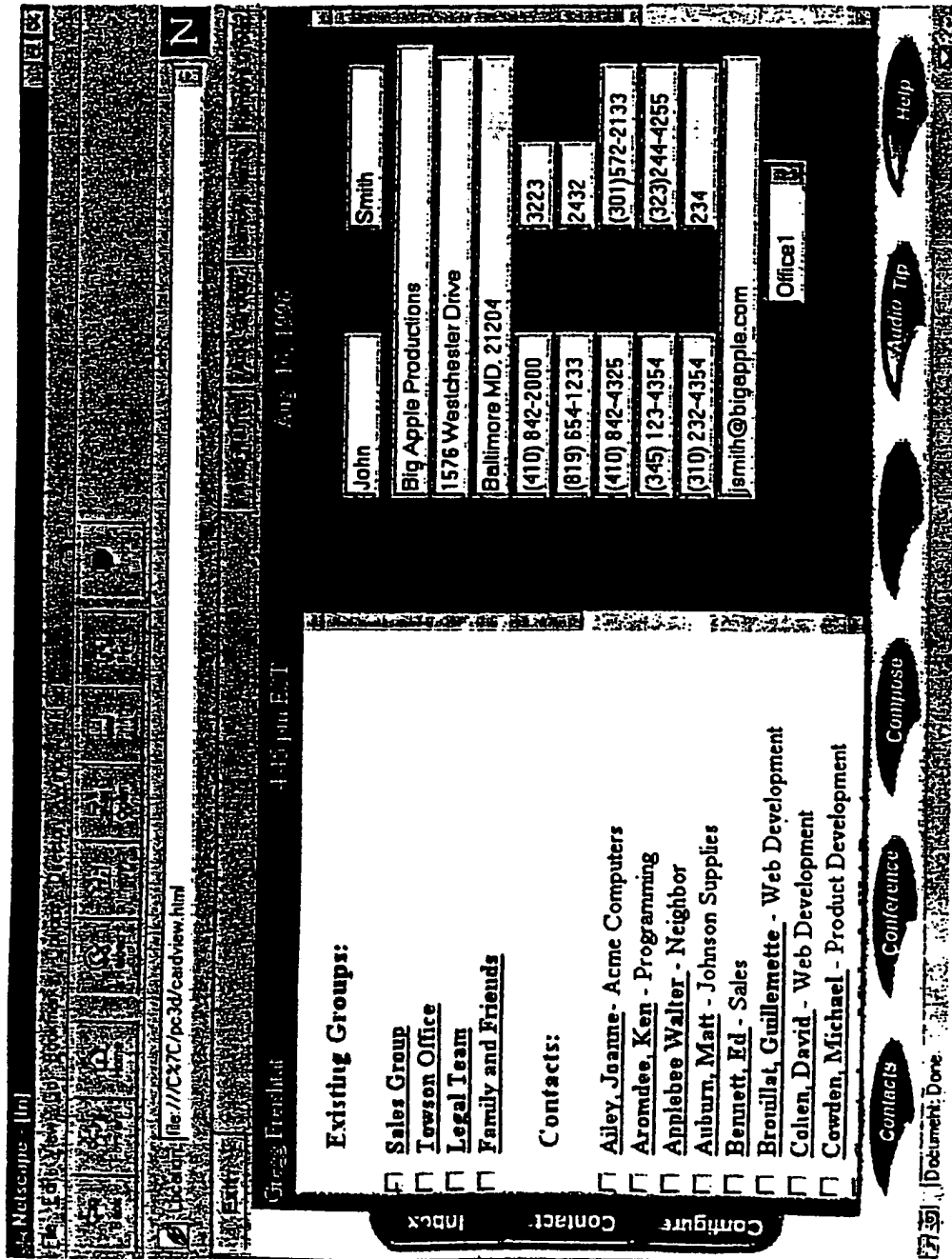


Fig. 19

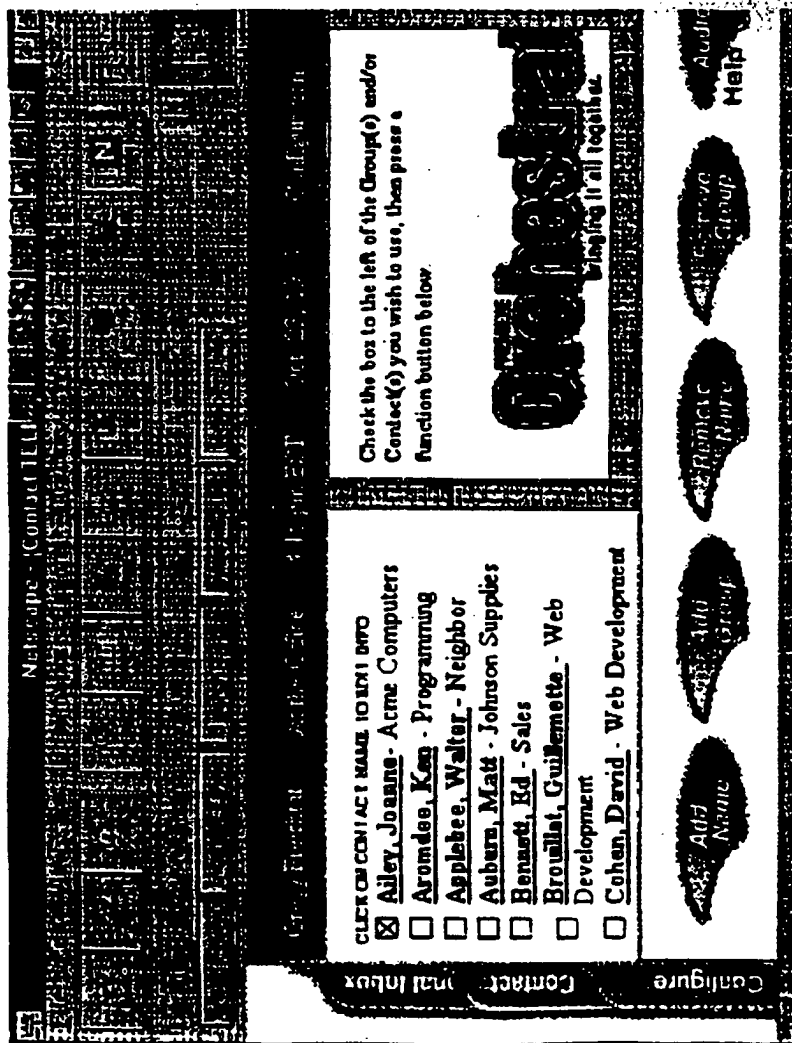


Fig. 20

[illegible]

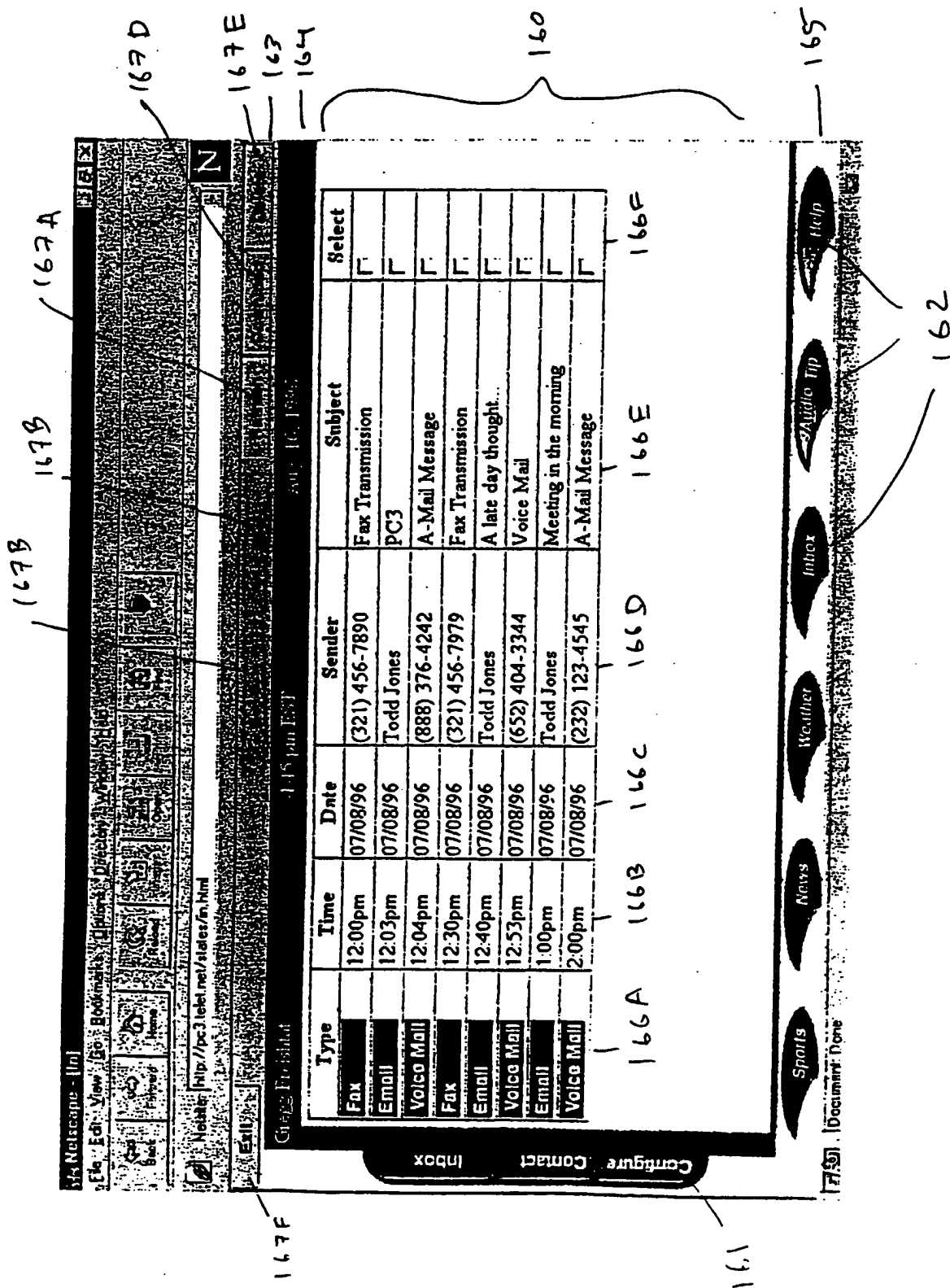


Fig. 21

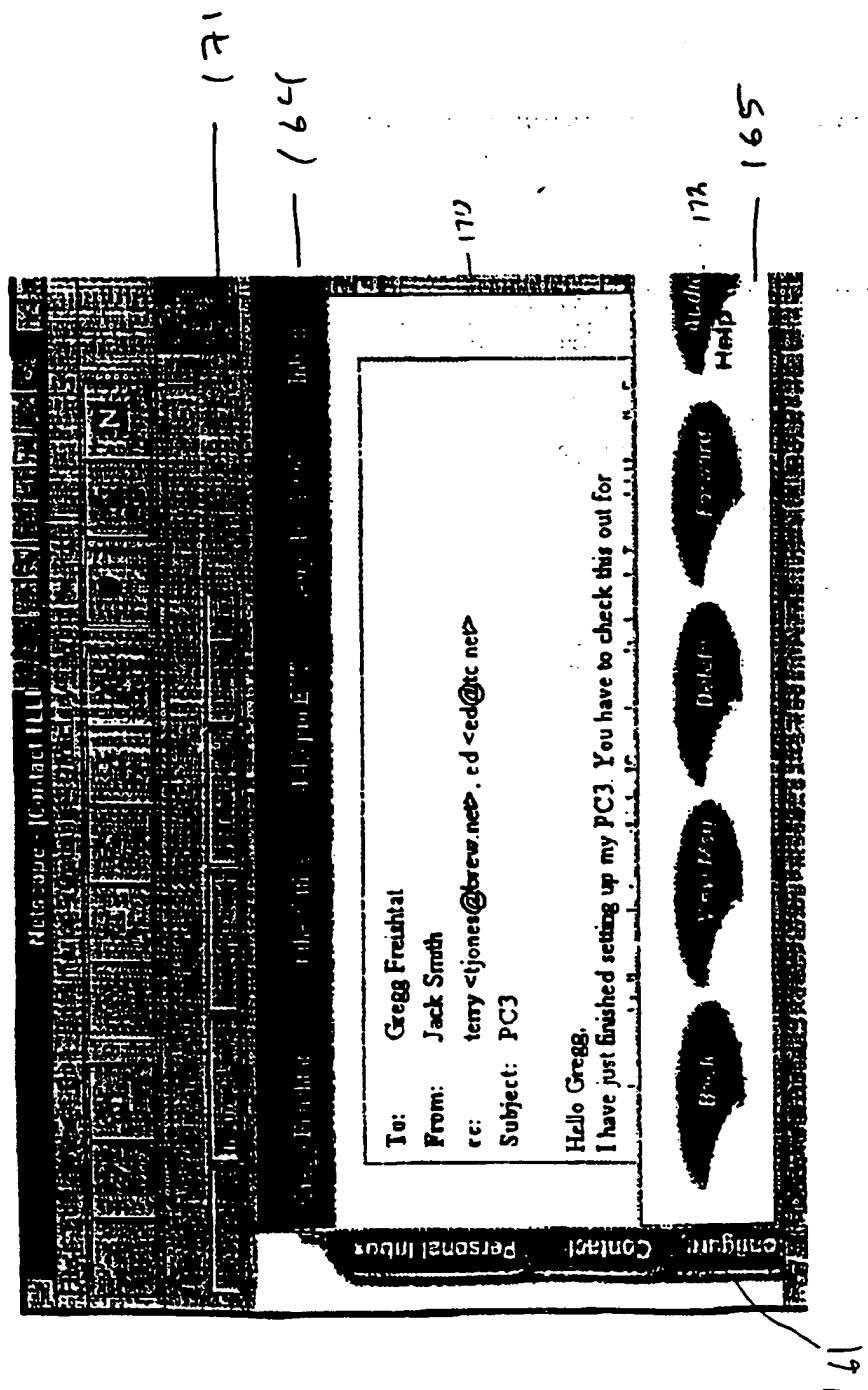


Fig. 22A

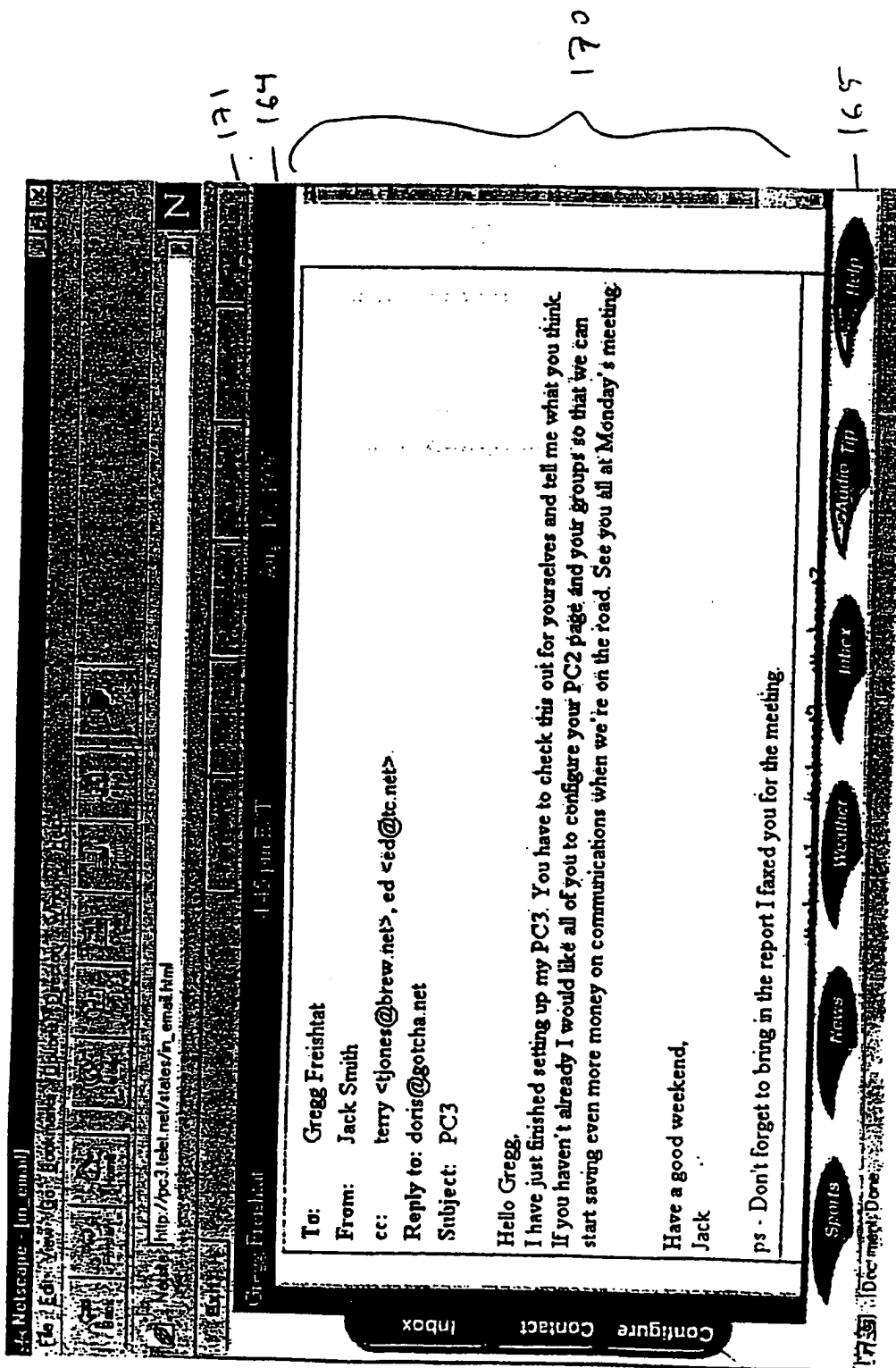


Fig. 22B

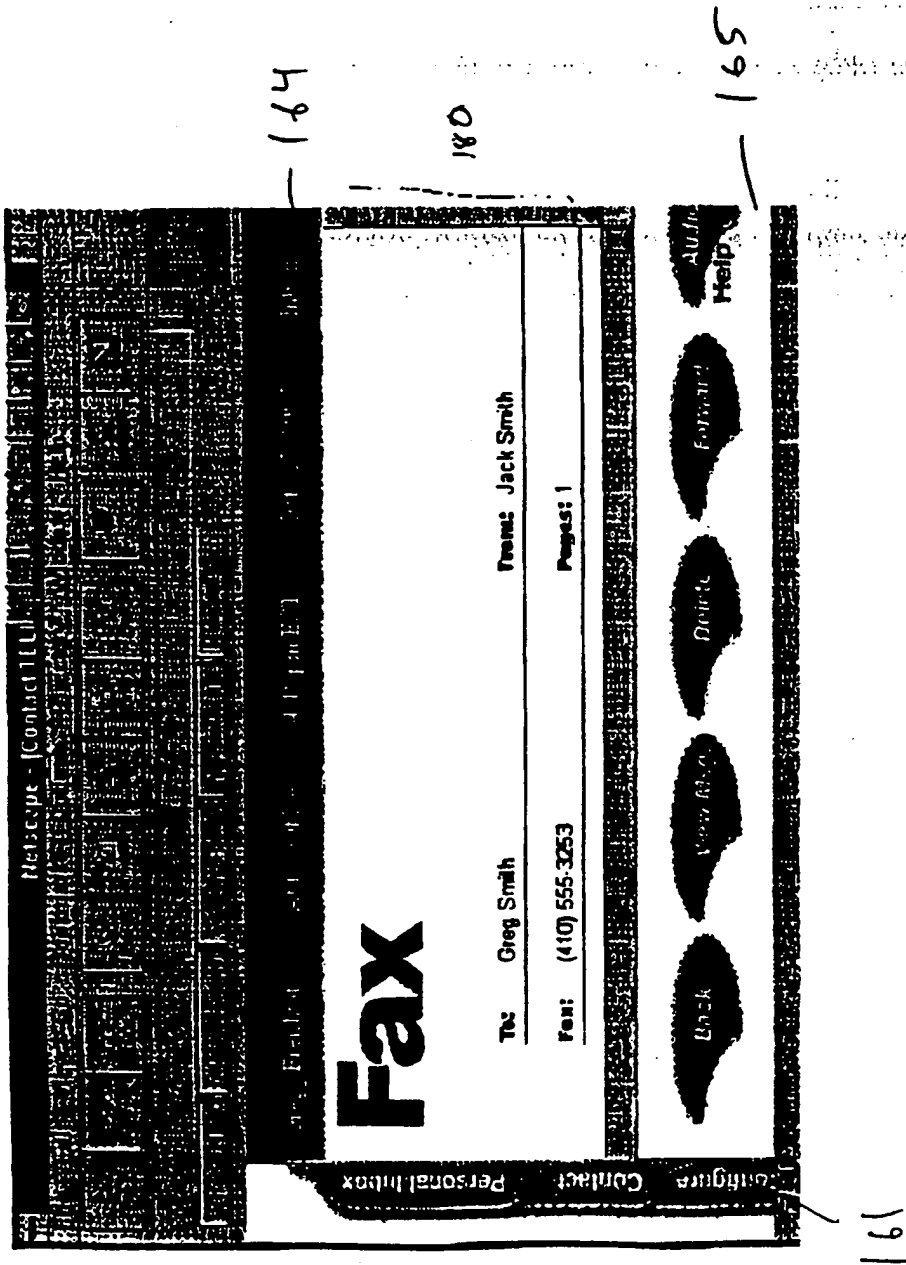


Fig. 23A

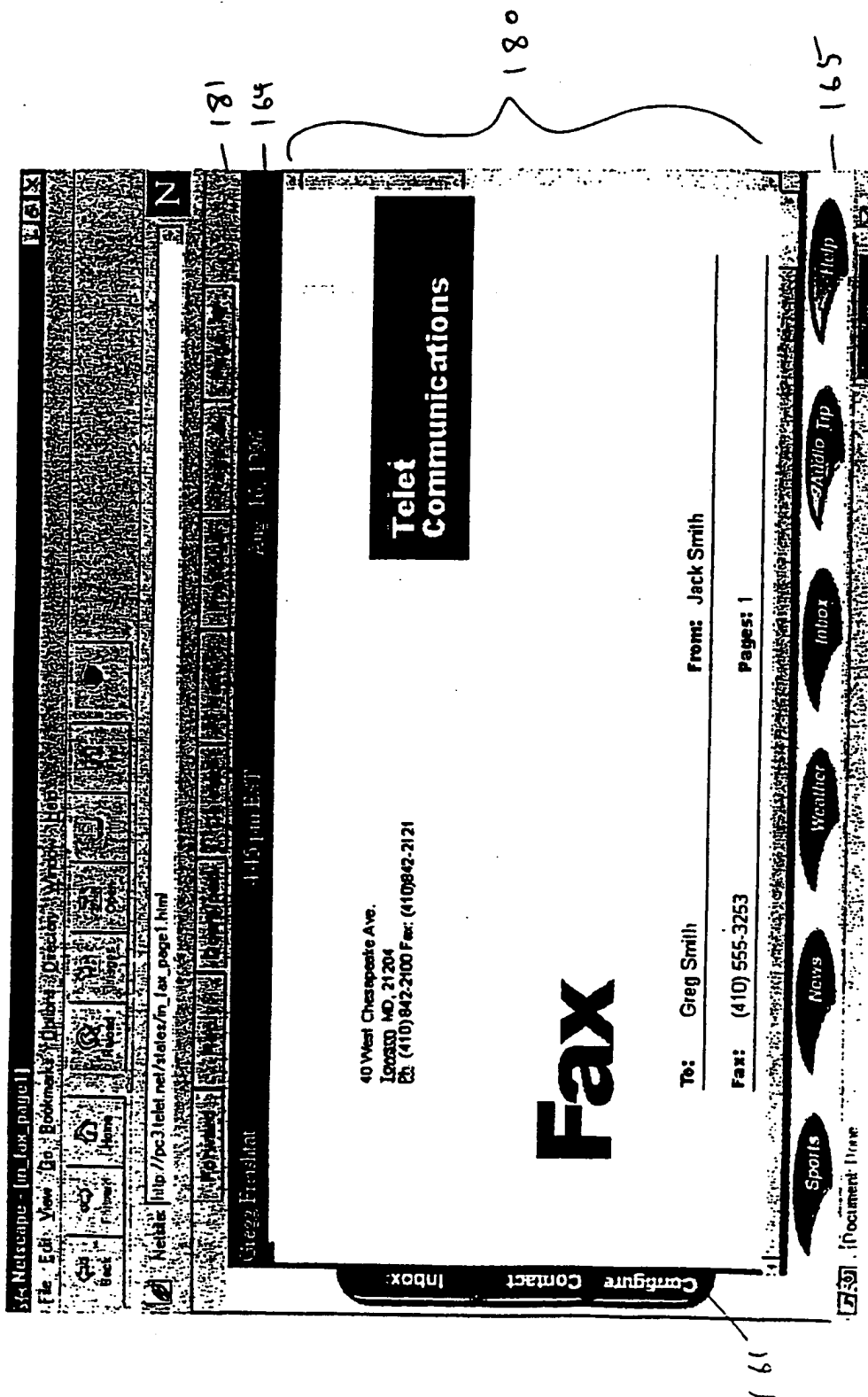


Fig. 23B

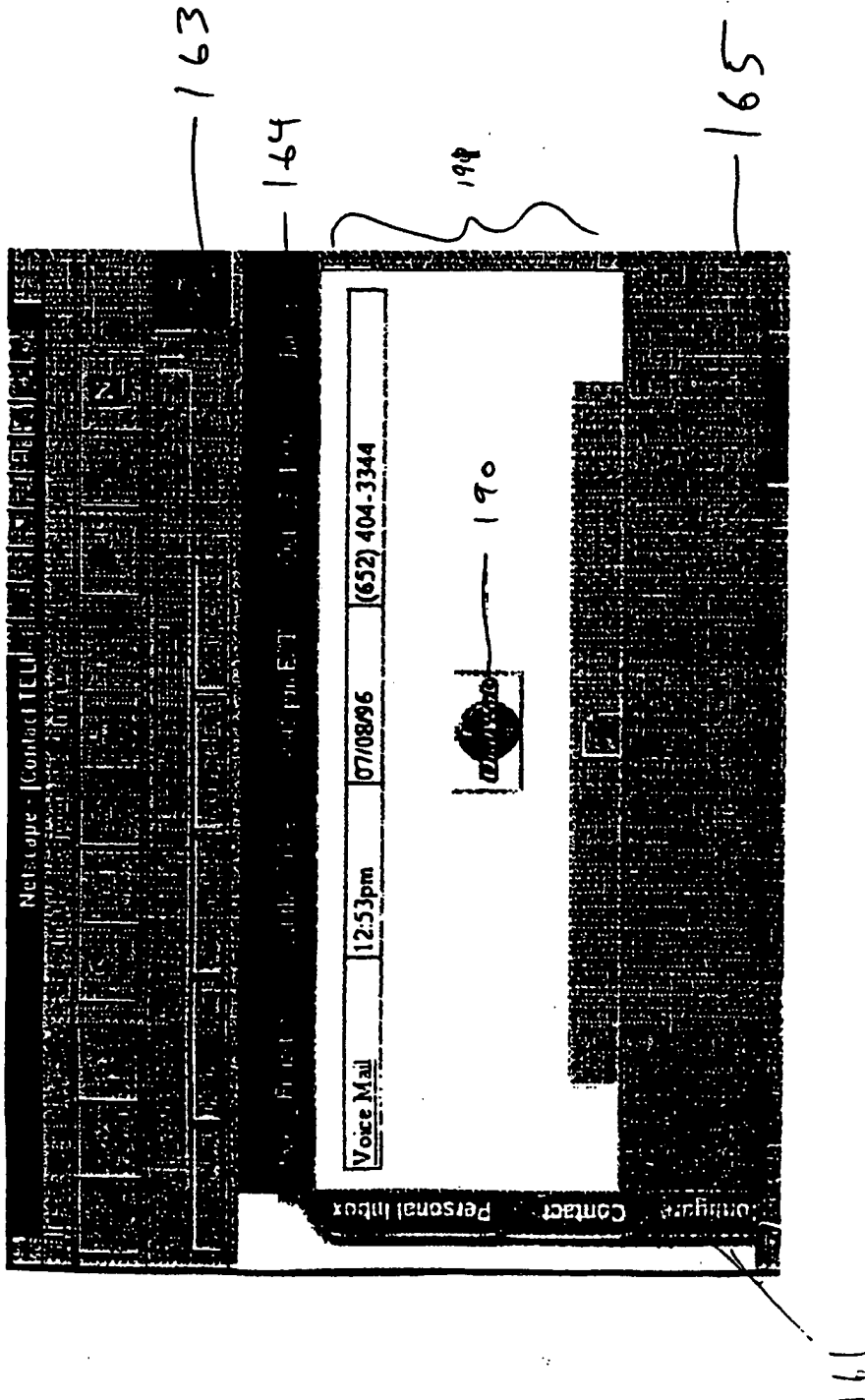


Fig. 24A

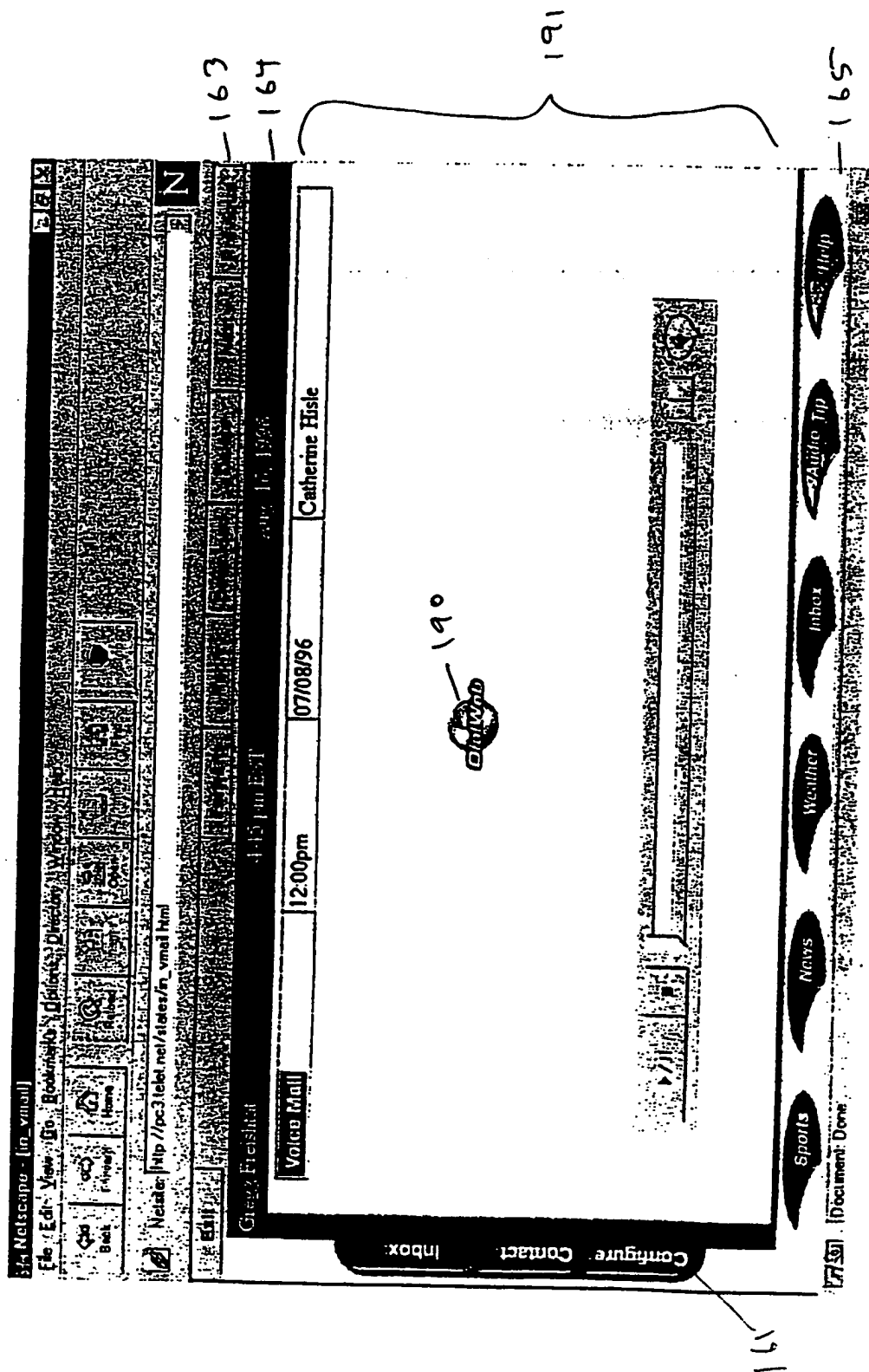


Fig. 24B

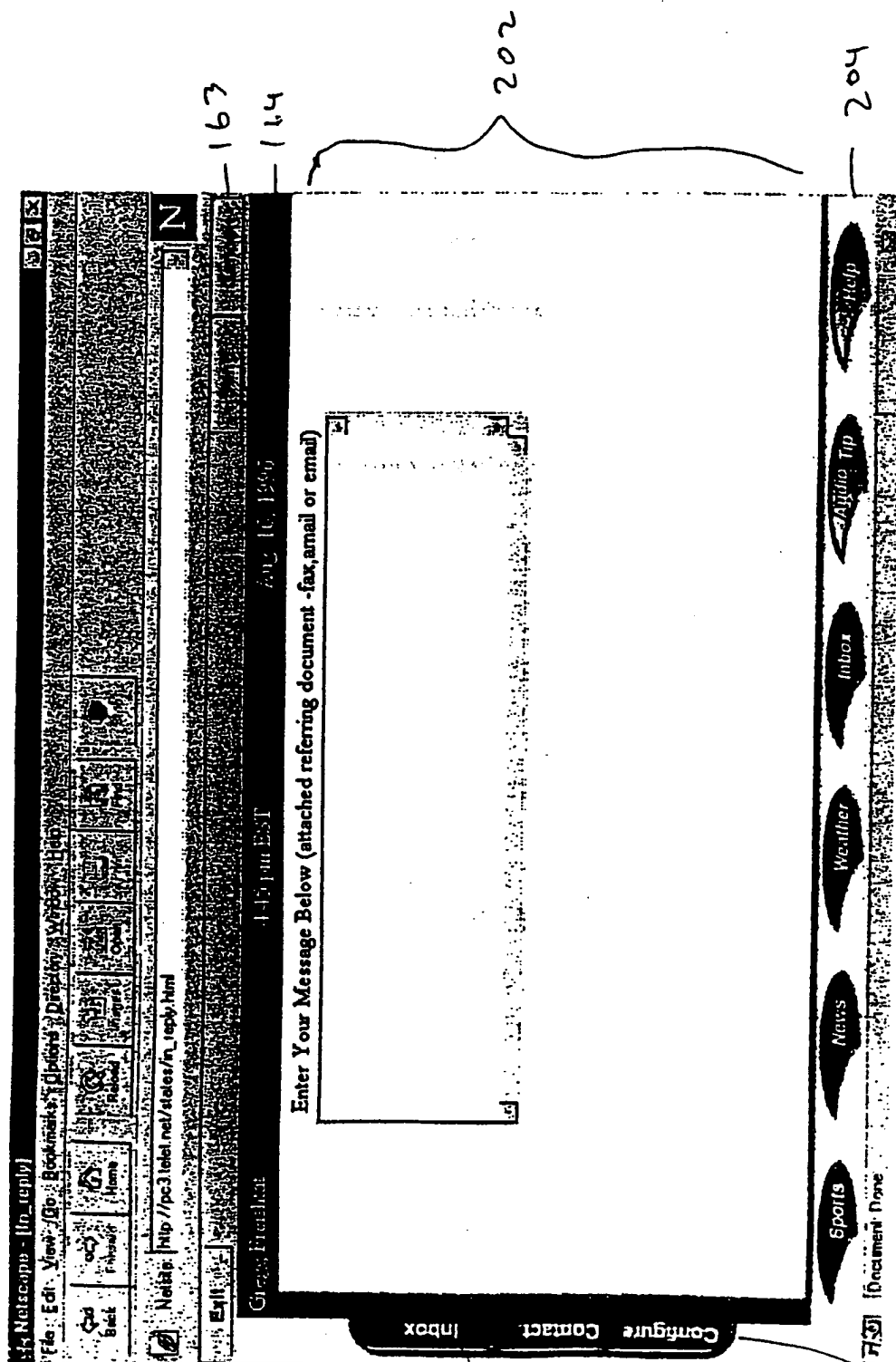


Fig. 25A

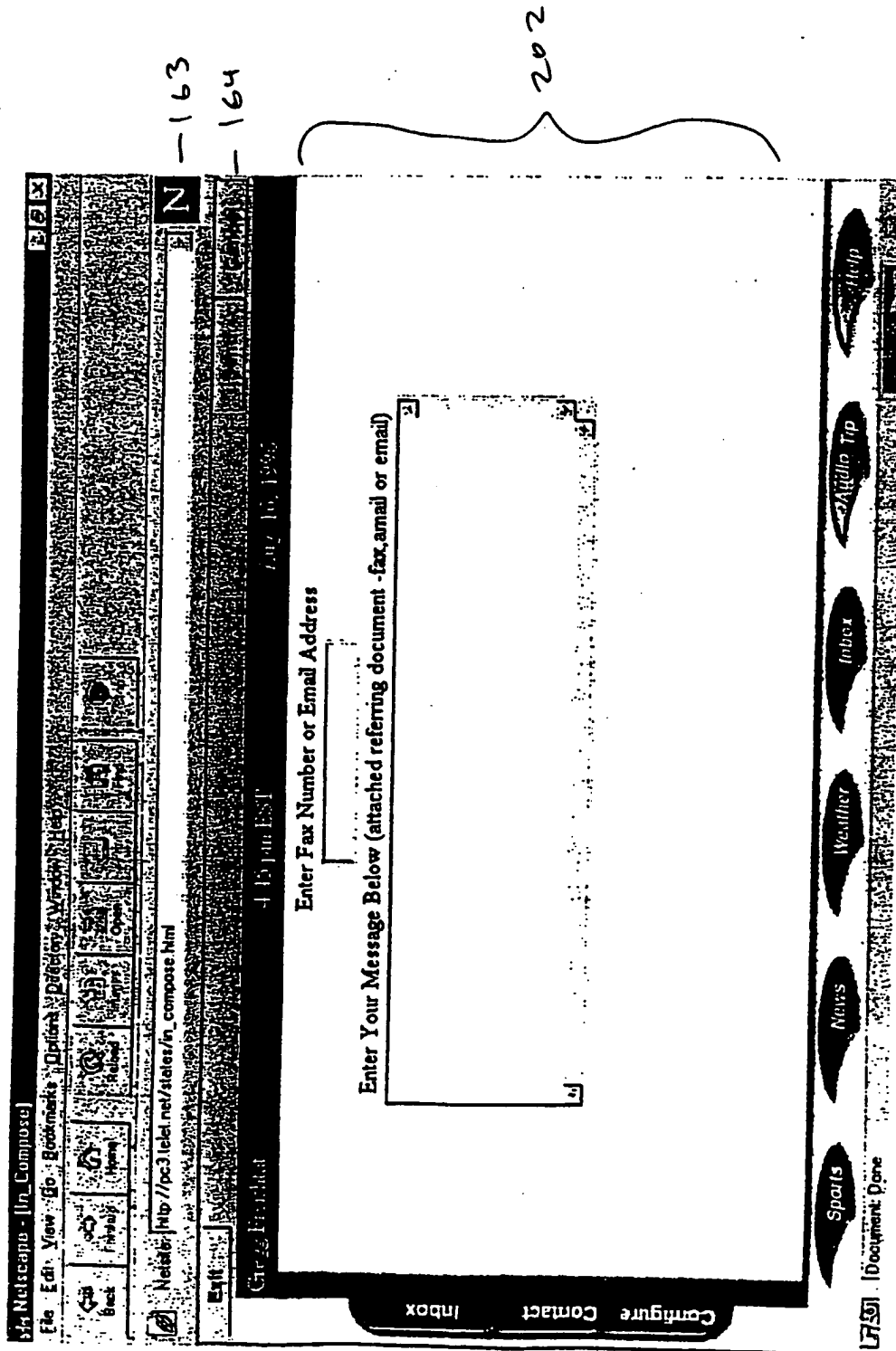


Fig. 25B

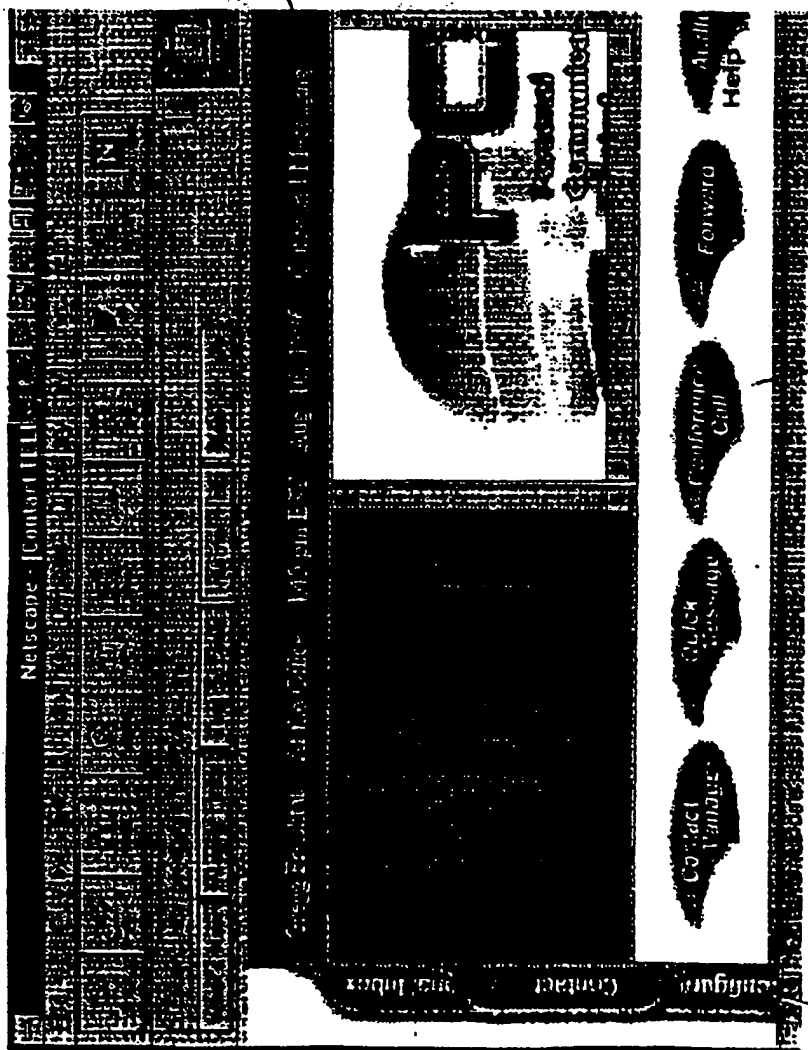


Fig. 26

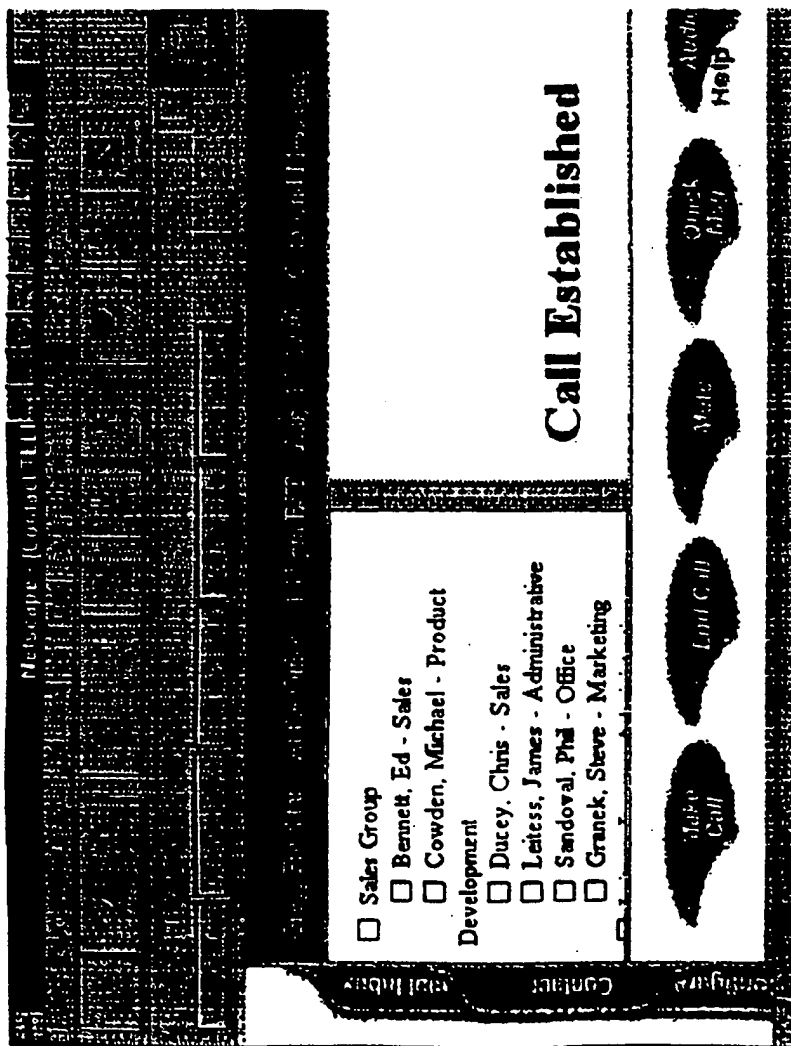


Fig. 27

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